The Milbank Memorial Fund

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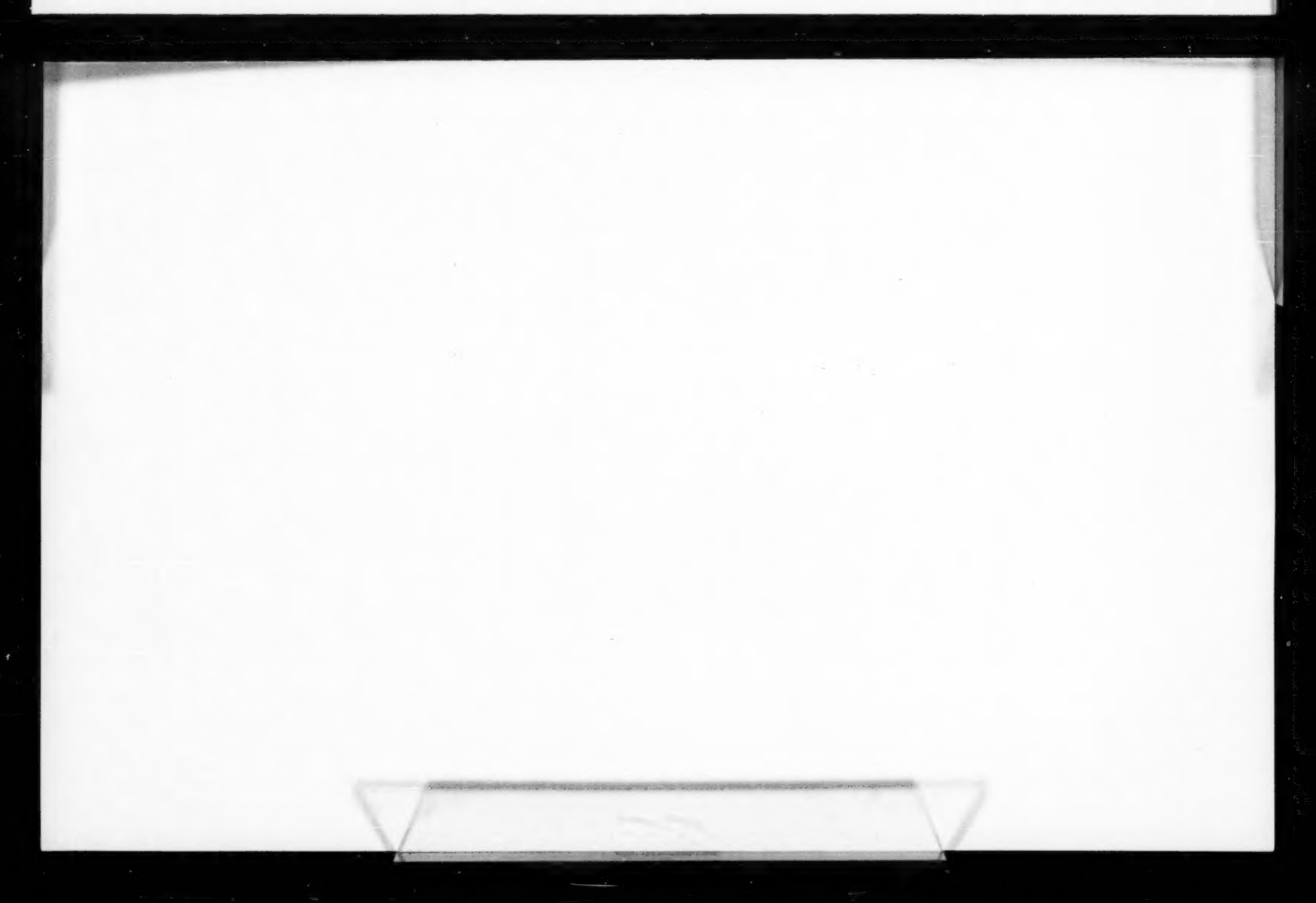

IN THIS ISSUE

NUTRITION in Relation to Health and Disease was discussed in a Round Table held at The New York Academy of Medicine, November 16–17, 1949, as part of the Annual Conference of the Milbank Memorial Fund. Understandably nutrition derives its significance from its purported relation to health and disease. Is malnutrition an influence on the contraction and perpetuation of disease? Does it lead to impairment of certain highly prized attributes of living? Or obversely, is satisfactory nutrition conducive to immunity and resistance to disease—and here the terms are used in their broadest sense? Does proper nutrition safeguard and enhance the body in its structure, functions, and life? Animal experiments give a presumptive answer, yes. In them nutrition has been shown to influence the course and outcome of pregnancy, the status of the newborn, growth, resistance to certain infectious diseases, ageing and longevity. But before unqualified acceptance of their applicability to man, evidence from studies on human subjects is necessary. Part of the Round Table program offered evidence of some of these associations in man.

Of late it has become increasingly suspected that nutrition casts its influence upon a group of diseases that have become a problem of considerable magnitude in medicine and public health: namely, chronic and degenerative disorders. Hence, another portion of the Round Table was given to exploration and orientation in this sector.

Not only a demonstration of its importance but also the availability of satisfactory methodology is essential to the practice of nutrition. Particularly necessary are clinical procedures for the appraisal of nutritional status and detection of deficiency states so that the amount of malnutrition in the popula-

tion may be measured, the affected persons be identified, and the particular natures of their impairments be differentiated. Accordingly, recently developed methods were set forth.

Thus the Round Table on Nutrition in Relation to Health and Disease presented several aspects of its subject: demonstration of significance, exploration, orientation, and technical advance. Abundant evidence was adduced to indicate the importance and readiness of nutrition for application in clinical medicine and public health.

One report given at the Round Table is published in the current issue of the *Quarterly* under the title "The Influence of Nutrition on the Course of Pregnancy." Other papers will be published in later issues and the complete Proceedings will be made available in a separate volume.

The Influence of Nutrition on the Course of Pregnancy included in this issue is a summary by Dr. Guttorm Toverud of a monograph by his late wife, Dr. K. Utheim Toverud, which was published in Norway in 1945 and reported the results of an experimental Health Station established in Oslo in 1939 for the prenatal supervision of pregnant women and for health supervision of infants born to these women and of other infants. The prenatal program emphasized dietary control which was supplemented by the addition of minerals or vitamins when these were deemed necessary. Over a five-year period marked improvements in the health of the mothers was noted. The stillbirth rate, neonatal mortality, and the frequency of premature births for the group with prenatal supervision at the Health Station were each about one-half or less than the corresponding rate for Oslo or for the total districts within Oslo which were served by the Health Station.

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Mr. Paul H. Jacobson, Vital Statistics Analyst, Metropolitan Life Insurance Company, presents in this issue a paper "Marital Dissolutions in New York State in Relation to Their Trend in the United States." The development of statistics on divorce has lagged far behind that of birth and death statistics in this country. The National Office of Vital Statistics is attempt-

ing to remedy the situation and about three-fifths of the states now have central registration of divorce of some kind. New York is not one of these and the preparation of Mr. Jacobson's report entailed a huge job of collecting data "by questionnaire from 52 of the 62 counties in New York State, and from a majority of the courts and counties in other states for which information has not been available since 1940." The report is not restricted to divorce statistics; it is concerned also with other types of marital dissolution.

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One of the round tables at the 1949 Annual Conference of the Milbank Memorial Fund was devoted to the topic "Modernization Programs in Relation to Human Resources and Population Problems." Four of the ten papers presented at that round table are included in this issue. All will be available eventually in a volume constituting part of the proceedings of the Conference.

The first paper in this series, "The Liberian Foundation: Aims and Methods," is contributed by Dr. Stanley J. Leland, Director of the Foundation. Under the initial stimulus of the late Edward R. Stettinius, two sister organizations, The Liberia Company and the Liberian Foundation were established with the cooperation of the Liberian Government, to foster respectively the economic and social development of Liberia.

In the next paper, "Utilization of Human Resources Through Industrialization," Dr. Wilbert E. Moore, of Princeton University, comments on certain theoretical aspects of the industrialization process and discusses labor mobility as one aspect of this process. He gives primary attention to the bearing of social institutions and attitudes of the people on problems of moving workers to new places and to new types of employment. For inductive evidence on some points he presents preliminary results from a field survey recently carried out in the Mexican "Zone" of Atlixco, where modern textile plants and Indian villages are in close proximity.

Some of the problems confronted in efforts at modernization through agricultural expansion are discussed in the paper,

"Utilization of Human Resources in Agriculture," by Dr. Conrad Taeuber, of the Food and Agriculture Organization of the United Nations. According to Dr. Taeuber, a major obstacle to the provision of adequate food for the world's population at present and in the foreseeable future consists not in a lack of resources or in a lack of scientific and technical knowledge, but in ignorance of ways and means of applying existing knowledge in different cultures. We need to know more about "the social processes by which change occurs, and by which desirable changes can be brought within a framework of the political and social values which we hold to be fundamental."

The paper, "Problems in Health Promotion in the Far East," is contributed by Dr. Marshall C. Balfour, who has spent more than a decade in the Orient as a regional director of the International Health Division of the Rockefeller Foundation. Dr. Balfour discusses the interrelation of public health problems in the Far East with problems of population, education, and economic and social development. In some respects his views with reference to public health policy in undeveloped areas depart rather widely from those that are now conventional in public health circles. For this reason the paper should attract wide attention.

THE INFLUENCE OF NUTRITION ON THE COURSE OF PREGNANCY[1]

GUTTORM TOVERUD[2]

"The Child is Nutritionally Nine Months Old at Birth." K.U.T.

IN THE new dental health plan for the preschool children in Oslo, started 1938, a plan for systematic health supervision of the pregnant and nursing mothers, the infants, and the preschool children was included. This prophylactic health supervision was undertaken as a scientific experiment in order to see to what extent it would be possible to decrease the very high caries frequency in the preschool children.

A so-called health station was erected in the Northeast part of Oslo, covering about one-fourth of the population, or 70,000 people. The station was opened in the spring of 1939 with Dr. K. Utheim Toverud as the medical director. After the plan was fully built up the personnel consisted of: one pediatrician (the director), one obstetrician, two other physicians as assistants, one dentist, one dental hygienist, one dental attendant, four public health nurses, two social workers, one laboratory assistant, one dietitian, and a qualified physical trainer. A psychologist gave lectures in mental hygiene for the mothers. From the public standpoint this health supervision was a voluntary one.

The plan for this health station was the following:

> A pregnant woman was expected to report at the station for examination and advice as early as possible in the pregnancy. After the first visit she was given an appointment for return to the station every fourth week during the first six months of pregnancy, every other week during the seventh and eighth months, and every week during the

[1] Compiled at the request of the Milbank Memorial Fund from Dr. K. Utheim Toverud's report on the first six years of activity of the Sagene Health Station in Oslo. *See* Toverud, K. Utheim: BERETNING—OM DE FÖRSTE 6AAS ARBEID VED OSLO KOMMUNES HELSESTASJON FOR MOR OG BARN PAA SAGENE (1939–1944). Oslo, Fabritius & Sönner, 1946.

[2] Professor of Pedodontia, Dental School of Norway, Oslo, Norway.

last month. As soon as possible after the delivery, usually two weeks, the mothers were asked to come to the station with the infants. The mothers, as well as the infants, were carefully examined. The infants were then seen once a month during the six first months and once every sixth week during the last half of the first year. From one to one and one-half years the children returned every second month, and later every third month. When the children reached one and one-half years they visited the dentist for the first time and received their dental record cards.

The Diet Regimen at the Station. The general plan with respect to diet can be divided into two main divisions: (a) prescribing a diet which met the needs of the particular individual; and (b) keeping the amount of sugar, sweets, and other refined carbohydrates as low as possible.

As the war broke out soon after the health station started, and with it the rationing of most of the foods set in, many difficulties arose in getting enough of the protective foods. As far as (b) is concerned, the strict rationing of sugar and other refined carbohydrates assisted that part of the plan.

In spite of the food difficulties, it was possible to meet fairly well the following standards set up at the start:

Recommended Food Intake During Pregnancy. One to 1½ gm. of protein per kg. of body weight was considered as optimum. During the war, however, there was very little meat protein and except for the protein in the three-quarter to one liter of milk and an egg now and then, the chief source of animal protein was fish (to a large extent salted and dried).

The calcium and phosphorus intake was figured at about 1.5 and 2 gm., respectively, and probably was kept up during the whole time. The need for iron was set at 20 mg., but on account of the low meat diet, it was not possible to obtain this amount in many cases without addition of iron salts.

Vitamins A and D were secured by giving one tablespoon of cod liver oil from September to May. Through this source alone the women got 7,000 I.U. of A, and 700 I.U. of D. Very

few women refused to take the cod liver oil, and these were given oil concentrates.

The optimum intake of Vitamin B_1 was set at 4 mg. In spite of using 95 per cent extraction flour and much potatoes, it was necessary to supplement the ordinary dietary intake of thiamine with brewer's yeast or synthetic vitamin B_1.

An intake of 75 mg. of vitamin C was sought. As very little citrus fruit was imported during the war, it was necessary in many cases to give ascorbic acid in synthetic form as a supplement.

After it was found early in the study that the amount of vitamin K in the green vegetables given to the pregnant woman was not sufficient to secure a low clotting time of the blood of the newborn, the routine procedure of giving 10 mg. of vitamin K daily during the last two to three weeks of pregnancy was adopted.

The amount of the different foodstuffs recommended was chiefly based upon earlier metabolism studies on pregnant and nursing mothers in Norway. But in order to obtain information about the nutritional status of the women in respect to some of the important nutritional factors, the following analyses very frequently were made: hemoglobin every or every other month, ascorbic acid of the blood and urine, serum calcium, and thiamine of the urine. The blood pressure was taken routinely and urine was tested for albumin.

Diet Recommendations During Lactation. Almost the same dietary regimen that was recommended during pregnancy was set up as a standard during the lactation period. Most of the same laboratory determinations were also performed; and calcium, vitamin B_1 and vitamin C studies of the breastmilk were included.

Infant Feeding. Breast feeding was of course encouraged as much as possible. The artificially fed babies were given a two-thirds milk mixture. From the age of two weeks, all infants, whether breastfed or not, received 1 to 2 teaspoons of cod liver oil (300–600 I.U. vit. D); and the premature infants, 900 I.U.

Fruit juice for all the infants also was started at that time. The premature infants routinely were given 100 mg. of reduced iron a day from the second month of age, and the same was given to other infants showing a low hemoglobin at four months of age. From the fourth month all the infants were given a vegetable-fruit dish in addition to the breast milk or the milk mixture.

I. The Influence of This Health Supervision on the Pregnant Mother

A. *The Frequency of Anemia.* As has been mentioned before, hemoglobin determinations were performed on every pregnant woman at the first visit and later, usually every month. A standardized Zeis Ikon hemometer was used.

In Table 1 is recorded the number of women during the different years on whom hemoglobin determinations were conducted and the per cent showing a hemoglobin concentration less than 12 gm. per 100 cc blood. These have been considered to be anemic. As will be seen, the anemia percentage during the first year was rather high—23, but dropped steadily during the next three years to the lowest value of 6, in 1942. Even in the two worst years of war, 1943 and 1944, the rates were as low as 11 and 8, respectively. And over the entire period there was never a person with a severe anemia.

With figures covering the six years of the study, Table 2 demonstrates that 75 per cent of 109 women who had had a hemoglobin value below 12 gm., reached normal blood values,

Table 1. The frequency of anemia in pregnant women.

Year	Number of Women Examined	Women with Less Than 12 gm. Hemoglobin Per 100 cc.	
		Number	Per Cent
1939	101	23	23
1940	85	15	18
1941	155	20	13
1942	201	13	6
1943	202	23	11
1944	333	26	8

Year	Number of Re-examined Women With Less Than 12 gm. Hemoglobin per 100 cc. Originally	Re-examined Women With 14.4 gm. or More Hemoglobin per 100 cc.	
		Number	Per Cent
1939	19	17	90
1940	12	10	83
1941	17	16	94
1942	8	8	100
1943	25	14	56
1944	28	17	61
Total	109	82	75

Table 2. Improvement of anemia in pregnant women by regulating diet and adding iron.

i.e., 14.4 or above after diet regulation and iron addition. Only during the two last years with the most difficult food conditions, did the annual percentages of correction of anemia drop below 83 to the levels of 56 and 61, respectively.

It may be concluded that the regimen practiced at this station prevented to a high degree the very common anemic conditions in pregnant women and cured to a large extent an existing anemia. This happened in spite of the very severe restrictions in iron-containing foods during the war.

A low hemoglobin reading alone is, of course, not always a certain diagnostic sign of anemia. The fact, however, that a high percentage of low hemoglobin values were increased by iron medication, gives strong evidence to the supposition that the lowering of the hemoglobin was caused by a real iron deficiency.

B. *Hypocalcemia in Pregnancy.* Serum calcium determinations were conducted on 1,003 pregnant women. Very few showed an unequivocally low calcium value, and it is difficult to know where to put the borderline between normal and pathological or subnormal values. In this study, 9 mg. per cent was characterized as the lower limit of the normal range. On this basis, Table 3 shows that during the two first years 15 per cent demonstrated subnormal values, compared with not more

Year	Number of Women Examined	Women with Serum Calcium Less Than 9 mg. Per Cent	
		Number	Per Cent
1939	101	15	15
1940	85	13	15
1941	146	5	3
1942	178	13	7
1943	205	9	4
1944	288	16	6
Total	1,003	71	7

Table 3. Blood calcium in pregnant women.

than 3 to 7 per cent during the last four years. That the values below 9 mg. per cent may be characterized as real subnormal levels is strengthened by the fact that of forty-nine women showing values below 9, forty-five very soon reached "normal" values after improvement in the diet alone or together with provision of a calcium-phosphorus supplement. *See* Table 4.

C. *Ascorbic Acid in Serum in Pregnant Women.* Determinations of ascorbic acid were performed on the sera of 1,092 pregnant women. The micro-method of Farmer and Abt[3] was used, and the value of 0.6 mg. per cent or above was taken as normal.

Table 4. Change in blood calcium in pregnant women after diet regulation alone or in combination with addition of calcium-phosphorus supplement.

Year	Number of Re-examined Women Originally Showing Serum Ca. <9 mg. Per Cent	Number of Women with Re-Examination Values for Serum Ca.-or >9 mg. Per Cent
1939	10	10
1940	10	9
1941	9	9
1942	7	5
1943	7	7
1944	6	5
Total	49	45

[3] Farmer, C. J. and Abt, A. F.: Determination of Reduced Ascorbic Acid in Small Amounts of Blood. *Proceedings of the Society for Experimental Biology and Medicine*, 34, 1936, p. 146.

Year	Number of Women Examined	Women with Less Than 0.6 mg. Per Cent	
		Number	Per Cent
1939	97	15	15
1940	86	10	12
1941	153	57	37
1942	211	105	50
1943	207	105	51
1944	338	201	60

Table 5. Percentage of pregnant women with serum ascorbic acid values less than 0.6 mg. per cent.

As will be seen from Table 5, the percentage of values below 0.6 mg. increased greatly during the war, from 15 and 12 per cent in 1939 and 1940, respectively, to 60 per cent in 1944. The mean value for this last year was 0.55 mg. per cent, compared with 0.93 in 1940. The cause of the steady decrease in serum ascorbic acid during the war was the restricted sources of vitamin C-rich foods for the pregnant women coupled with the great demand for this food factor. But no manifest clinical signs of vitamin C deficiency were observed in the women, except for a few cases of gum bleeding. Women with an ascorbic acid value below 0.4 mg. per cent were given synthetic vitamin C. As described before, the aim was to plan the diet so that it would provide at least 75 mg. of ascorbic acid a day. From the data of blood analyses it would appear that an intake of 75 mg. a day was not reached, or that this amount is not sufficient during pregnancy to keep the blood level of ascorbic acid at or above 0.6 mg. per cent.

D. *The Excretion of Thiamine in the Urine in Pregnant Women.* In order to look into the status of vitamin B_1 in the pregnant women the excretion of thiamine in the urine was determined in 671 of them. The method of Jansen, modified by Wang and Harris,[4] was used. Healthy adult non-pregnant and non-lactating women on an average good diet showed an excretion of about 200 micrograms per 24 hours. As will be seen

[4] Wang, Y. L. and Harris, L. J.: Estimation of Vitamin B_1 in Urine by the Thiocrome Test. *Biochemical Journal*, 33, 1939, p. 1356.

from Table 6, as many as one-third of the pregnant women did not show any thiamine in the urine. The percentage of women not excreting any thiamine varies by year from 20 to 44, and there is no consistent trend in the values during the six observation years.

Corresponding to this high percentage of women not excreting any thiamine, many women were complaining of cramps in their legs, numbness of fingers and toes, and neuralgic pains. After administration of brewer's yeast or synthetic vitamin B_1 so that the total intake of thiamine reached 6–9 mg. daily, these symptoms as a rule disappeared and thiamine was recovered from the urine. As a consequence, brewer's yeast was given routinely to the pregnant women during the last years. Those not able to take the yeast were given synthetic B_1.

The very common symptom—constipation—during pregnancy was also frequently present in the entire group, especially in the women first entering the station. This symptom usually disappeared after taking brewer's yeast. Whether the vitamin B_1 or other factors in the yeast were responsible for this effect could not be stated.

E. *Tuberculin Tests in Pregnant Women.* Of 914 pregnant women observed during the six years, 65 per cent reacted positively to the Pirquet or Mantoux test. By x-ray inspection of the positive ones, only three were found to have an active tuberculosis.

Table 6. Per cent of pregnant women with no thiamine excretion in the urine.

Year	Number of Women Examined	Women with no Excretion	
		Number	Per Cent
1939	78	28	36
1940	75	33	44
1941	109	26	24
1942	131	26	20
1943	144	58	40
1944	134	52	39
Total	671	223	33

F. *Wassermann Reaction in Pregnant Women.* Of 1,025 pregnant women given the Wassermann test, six showed a positive reaction.

G. *Pre-eclamptic Signs.* The three most common signs of a beginning pregnancy intoxication: albuminuria, increased blood pressure, and edema were carefully watched for in every pregnant woman supervised at the station. It is seen from Table 7 that the percentage of albuminuria was fairly high—12 and 19 per cent in 1939 and 1940, respectively (soon after the station was opened), but during the next four years it varied between 2 and 7. These last figures must be characterized as very low. It cannot be stated whether or not this decreased frequency of albuminuria was due to the regimen at the health station or to the low intake of meat protein during those years.

The figures for elevated blood pressure, compared by years, show considerable differences. During the first and the last two years the percentage of women having a systolic blood pressure greater than 140 mm. was very low (5 to 7) but during the other years it was as high as 17 to 27.

The third sign—edema—was very frequent, and did not show any tendency to reduction in the later years of observation. This high percentage of edema may be accounted for by the low intake of animal protein, and, partly also, by a low in-

Table 7. The frequency of albumin in urine, hypertension and edema in pregnant women.

Year	Number of Women Examined	Women with Specified Condition					
		Albumin in Urine		Systolic Blood Pressure > 140 mm.		Edema	
		Number	Per Cent	Number	Per Cent	Number	Per Cent
1939	113	14	12	8	7	6	5
1940	86	16	19	23	27	43	50
1941	138	3	2	23	17	43	31
1942	147	10	7	35	24	62	42
1943	203	11	5	10	5	84	41
1944	338	7	2	20	6	132	40
Total	1,025	61	6	119	12	370	36

take of thiamine. (The frequency of edema was very high in the adult population in Norway during the war, and especially among the women.)

Among the pregnant women examined up to the last week before partus not a single case of eclampsia occurred. Two women, however, *not* visiting the station during the last weeks of pregnancy, developed a mild eclampsia just before delivery, but recovered very soon postpartum. If these two cases are included, the health station had an eclampsia frequency of 0.2 per cent. But it should be remembered that these two had not followed the regimen of the station during the last part of pregnancy. Although not strictly comparable to this material, it can be mentioned that other statistics from Norway showed an eclampsia rate of from 0.6 to 1.6 per cent.

Thus, it may be stated that the health of the women supervised at the station was extremely good.

II. The Influence of the Health Supervision During Pregnancy on the Newborn Infant

A. *The Stillbirth Rate.* Table 8 presents the stillbirth rate of the City of Oslo as a whole, of the Sagene Health Station, and of Sagene and Torshov districts. The Health Station operates in these districts, but not more than about one-third of the total population of pregnant women has attended it. As will be seen from the table, the stillbirth rate for the whole City is 23.6 per 1,000 births, compared with 14.2 for births to women attending the Health Station. On the other hand, the districts

Table 8. Stillbirth rate at Health Station compared with that of the City of Oslo.

Area	Year	Total Number of Infants Born	Number of Stillborn Infants	Stillborn per 1,000
City of Oslo	1939–1946	29,191	688	23.6
Sagene and Torshov Health Station	1939–1946	4,522	128	28.3
	1939–1947	1,553	22	14.2

served by the station have a higher rate, 28.3, than the City as a whole. The reduction of the stillbirth rate in the women attending the Health Station is in reality even greater than appears from the figures, as one-third of the total for the Sagene and Torshov districts is the data from the Health Station. Thus it cannot be questioned that the regimen as practiced for the pregnant women at the Health Station has a very great beneficial influence on the stillbirth rate. This may be said to have reduced the rate by 50 per cent.

B. *The Infant Mortality.* The total infant mortality, deaths before one year, may be influenced to a certain extent by the health status of the newborn and also by conditions during pregnancy. The death rate in Oslo has dropped from 12.5 per cent of total live born in 1900 to 3.0 per cent in the years 1939–1944. (Table 9.) During the latter period, for infants born of mothers supervised during pregnancy in the Health Station, the total infant death rate was not more than 1.4 per cent, but in the surrounding districts of the Health Station it was 2.6 per cent. The difference between the rate for the City of Oslo and for the Health Station is significant statistically.

The neonatal mortality, deaths before one month, has not decreased to the same extent during the last years as has the total infant mortality. The neonatal mortality expressed as percentage of the total infant mortality has steadily increased from 24 per cent in Oslo in 1900 to 65 per cent in 1939–1944.

Table 9. Total infant mortality and neonatal mortality in the City of Oslo.

Area	Years	Number of Live Born Infants	Deaths During			
			First Year		First Month	
			Number	Per Cent	Number	Per Cent
City of Oslo	1939–43	14,547	437	3.0	287	2.0
Sagene and Torshov Districts	1939–43	2,276	59	2.6	32	1.4
Health Station	1939–44	728	10	1.4	8	1.1

In the data from the Health Station study during the latter five-year period, it is 80 per cent. But the rate of neonatal mortality of total live-born infants is lower in the Health Station material than in the City of Oslo. The figures are 1.1 and 2.0, respectively, for the five-year period. Of 728 live-born infants born of supervised mothers from the Health Station, eight died during the first month, and of these, five were prematures.

C. *The Influence on Prematurity.* It is well known that the prematurely born infants make up the bulk of the morbidity as well as of the mortality groups in infancy. Reducing the number of premature infants, therefore, would be a very important prophylaxis. In order to evaluate the possible influences of prenatal supervision on this rate, the data from the Health Station are divided into two groups: children born of supervised mothers, and children born of unsupervised mothers. On the basis of prematurity at a birth weight of 2,500 gms. or less (five pounds, eight ounces or less), the premature birth rates are 2.2 and 4.6 per cent, respectively, and prematurity among supervised mothers was less than 50 per cent as frequent as among the non-supervised. The difference between these prematurity rates is nearly three times the standard error of the difference. (*See* Table 10.)

Table 10. Frequency of premature births based on birthweight 2,500 gms. or less (5 lbs., 8 ozs. or less).

Year	Infants Born of Mothers					
	With Prenatal Supervision			Without Prenatal Supervision		
	Total No. Born	Premature		Total No. Born	Premature	
		Number	Per Cent		Number	Per Cent
1939	67	1	1.5	236	15	6.4
1940	95	2	2.1	308	15	4.9
1941	92	3	3.3	363	17	4.7
1942	102	0	0.0	410	14	3.4
1943	145	5	3.4	426	27	6.3
1944	227	5	2.2	648	21	3.2
Total	728	16	2.2	2,391	109	4.6

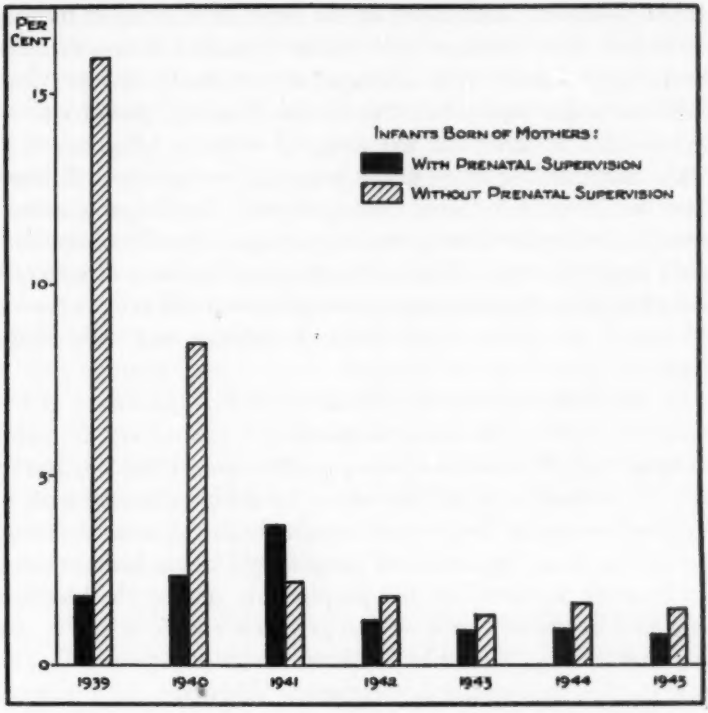

Fig. 1. Comparison of the frequency of rickets or osteoporosis in infants born of mothers having prenatal supervision at the Health Station and in infants born of mothers not having this prenatal supervision.

Thus, the regimen practiced at the Health Station during pregnancy had a beneficial influence on the rate of prematurity.

D. *The Influence on the Frequency of Rickets and Osteoporosis.* For a short time, calcium, phosphorus, and phosphatase determinations were made on the infants' blood and x-rays were taken in conjunction with a clinical examination in order to ascertain the status of mineralization. But on account of shortage of technical assistance other methods than the clinical ones had to be dropped. The signs watched for and taken as indicative of a disturbance in the mineralization were the following: craniotabes, the furrow of Harrison, rosary, en-

larged epiphysis, and bowing of the legs. In all cases of bowing of the legs x-ray pictures were taken. Figure 1 shows that the percentage of such bone changes in prenatally unsupervised children in the year when the Health Station opened was as high as 15.9 per cent and has dropped down to 1.5 per cent in 1945. But the frequency in the prenatally supervised children was even lower, 0.9 during the same year. In the prematurely born infants and in twins prenatally and postnatally supervised, not a single instance of such bone changes has been discovered. It is clear from this that prenatal supervision will reduce the incidence of osteoporosis and rickets in infancy and early childhood.

E. *The Influence on the Clotting-Time of the Blood of the Newborn Infant.* As birth hemorrhages are a very frequent cause of early death or various paresthesias in children, and in turn are caused to a certain extent by a high clotting-time of the blood, vitamin K was given routinely to the women during the two to three last weeks of pregnancy. It has been pointed out by some authors that the prophylaxis against the bleeding tendency in the newborn was to give cow's milk at birth. By bacterial action, this would produce enough of vitamin K. The logic of this, however, is not rational. When the child is born, the bleeding has already started and may have caused irrepar-

Table 11. Average coagulation time in minutes of infants' blood during first week after birth.[1]

Age of the Infant in Days	In 35 Infants Born of Mothers Without Vitamin K	In 23 Infants Born of Mothers With 10 mg. Vitamin K Per Day	Difference	Standard Error of Difference
1		2.7		
2	5.7	3.4	2.3	±0.34
3	5.2	3.5	1.7	±0.40
4	4.9	3.5	1.4	±0.36
5	4.9	3.3	1.6	±0.40
6	4.9	3.4	1.5	±0.38

[1] Cow's milk mixture given at birth to both groups.

able damage to the child. A factor in the bleeding possibly may be found also in pathology of the vessel wall. Moreover, as Table 11 shows, the clotting-time is much lower in infants given cow's milk from birth and born of mothers given vitamin K in pregnancy than in infants given cow's milk from birth but born of mothers not taking vitamin K. The difference is statistically significant. Furthermore, the administration of cow's milk to newborn infants born of mothers having taken vitamin K, does not lessen the coagulation time of the infants' blood materially, so this procedure may be of no value when vitamin K is given during pregnancy.

Not a single case of brain damage has been diagnosed clinically among 1,531 live-born infants born of mothers given vitamin K. As the average incidence of brain damage due to so-called birth injury is 0.5 per cent, one would expect seven to eight such cases in the material of the Health Station. One woman, however, supervised but *not* having taken vitamin K gave birth to a child with brain hemorrhage.[5]

III. The Influence of the Health Supervision During Pregnancy on the Nursing Mothers

As has been pointed out earlier, the lactating mothers have been carefully supervised by clinical examinations and various laboratory tests. The time does not allow me to refer to anything but:

The Influence on the Lactating Power. In order to evaluate the influence of the Health Station regimen on nursing capability, the mothers were divided into two main groups: those who have been supervised at the station during pregnancy, and those who have not been supervised. For each of these groups, the percentage of mothers whose infants were breast fed only for nine months, without addition of cow's milk, was determined. (As will be remembered from the description of the regime of infant feeding, all infants at four months of age are

[5] Toverud, K. Utheim: Prophylactic Pediatrics. *Medical Woman's Journal*, 55, November, 1948, p. 39.

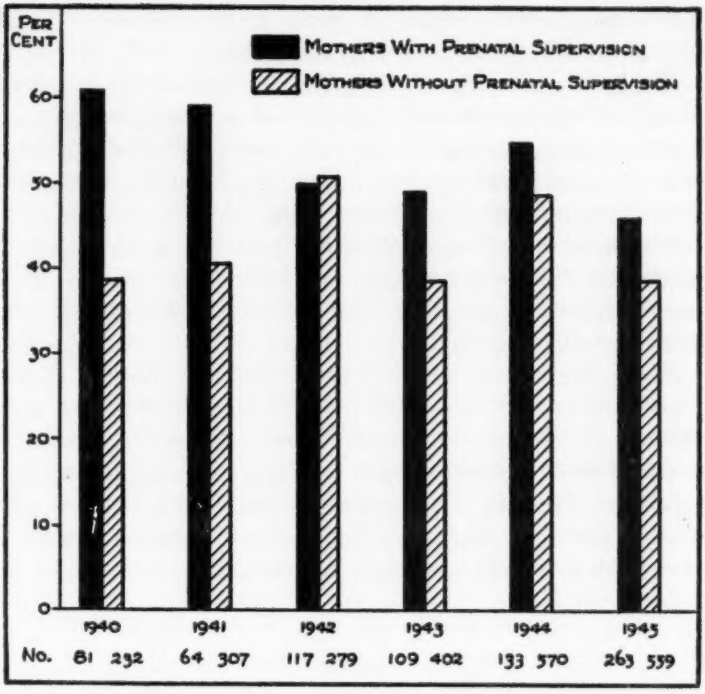

Fig. 2. Per cent of mothers whose infants were breast fed only for nine months among the group that had prenatal supervision at the Health Station and among a group that did not have this prenatal supervision.

given a fruit-vegetable dish.) As will be seen from Figure 2, the percentage that breast fed their babies for nine months is high in both groups, comprising 2,466 mothers. But, except for the year 1942, the percentage of mothers capable of nursing their babies is always higher in the prenatally supervised group than in the other group. The difference is highest during 1940 and 1941 before the severest rationing period. The higher lactating power of the prenatally supervised women may be ascribed to a better preparation of the lactating glands before partus, chiefly on account of the dietary regimen. As the knowledge of this regimen became more and more widespread among all women in the district, the unsupervised pregnant

women may have changed their diet. Such a change is a plausible explanation for the lessening of the difference in the lactating performance of the two groups. The greater restriction in the sources of food for all women as the war went on may also have played a role in partly leveling the figures for both groups.

It cannot be questioned that the supervision of the pregnant woman was of great value in her ability to nurse her baby.

Summary

From this brief review of the activities of the Sagene Health Station in Oslo it has been shown that the regimen was of great value in improving the general health of the pregnant and lactating women and of the infants and children. The common disorders during pregnancy such as anemia and albuminuria were greatly reduced by supervising the pregnant women. The lactating power of the mothers increased in spite of the fact that this ability is commonly high in Norway. The stillbirth rate, the neonatal as well as the total infant mortality rates have been reduced about 50 per cent, compared with the respective figures for the City of Oslo. The prematurity rate was markedly lowered and no birth hemorrhages occurred. Rickets was totally eliminated and even the milder pathological bone changes practically disappeared.

The great improvement in health of mother and child was accomplished by a regimen comprising medical supervision and dietary management, including provision of supplements. To evaluate the importance of each of these factors separately is not possible. However, together they raised the nutritional status of the subjects.

"The child is nutritionally 9 months old at birth" has for more than twenty years been a working hypothesis in research as well as in clinical activities of the late Dr. K. Utheim Toverud. The results from this Health Station together with results obtained by other investigators have transferred the phrase from an hypothesis to a reality.

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The regimen for the Health Station was planned chiefly on the basis of the following studies by Dr. K. Utheim Toverud:

Toverud, K. Utheim and Toverud, G.: Studies on Mineral Metabolism During Pregnancy and Lactation and its Bearing on Disposition to Rickets and Dental Caries. *Acta Paediatrica,* Supplem. 2, 12, 1931, pp. 1–116.

Toverud, K. Utheim: Untersuchung über das Knochensystem bei Neugeborenen. *Zeitschrift für Kinderheilkunde,* 56, 1934, p. 66.

Toverud, K. Utheim and Ender, F.: Undersókelser over A- og D-vitamininnholdet i nyfödte barns lever. (The Content of Vitamin A and D in the Liver of the Newborn) *Norsk Magasin for Lägevidenskapen,* 96, 1935, p. 947.

Toverud, K. Utheim: Vitamin C Content of Liver of Newborn Infants. *Archives of Disease in Childhood,* 10, 1935, p. 313.

Toverud, K. Utheim: Undersökelser over jernstoffskiftet i svangerskapet. I. Jerninnholdet i vaare näringsmidler. II. Stoffskifteforsök paa svangre kvinner. III. Hemoglobin-og jernbestemmelser i svangre kvinners. blod. (Investigations on the Iron Metabolism During Pregnancy. I. The Iron Content of our Food Articles. II. Metabolism Studies on Pregnant Women. III. Hemoglobin and Iron Determinations in Blood of Pregnant Women.) *Norsk Magasin for Lägevidenskapen,* 96, 1935, pp. 177, 259, 381. (English Summaries.)

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Toverud, K. Utheim: Welfare Work in Mother and Child. *Acta Paediatrica,* 24, 1939, p. 116.

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Toverud, K. Utheim: The Excretion of Aneurin in Pregnant and Lactating Women and in Infants. *Zeitschrift für Vitaminforsch,* 10, 1940, p. 255.

MARITAL DISSOLUTIONS IN NEW YORK STATE IN RELATION TO THEIR TREND IN THE UNITED STATES

PAUL H. JACOBSON[1]

THERE has been no nationwide survey of divorce in the United States since 1940. In the last few years, however, the Federal government has stimulated interest in building a registration area for divorce, from which comprehensive statistics could eventually be made available for an expanding area of the country. This method of collecting data which proved so successful in the development of national birth and death statistics, depends for its success on the registration of vital events at the state level. It is encouraging that an increasing number of states have enacted divorce legislation in this regard, and that about three-fifths now have central registration of some kind.

New York is not one of these states. As a matter of fact, ever since 1923, bills for the central registration of divorce with the State Department of Health have been proposed to the State Legislature, but without success. In this connection, it is important to note that the Judicial Council of New York State has the authority to collect and publish divorce statistics, but it has not done so to date. It is considering the matter, however, so perhaps some facts on marital dissolutions in New York State will be routinely available in the near future.

In the absence of such data from a state agency, it is necessary to contact New York's county clerks in whose offices decrees are filed. In New York, as in other states without central registration, procedures vary from one county to another. Some counties file all court records alphabetically; in others all records are filed alphabetically for each year separately; some

[1] Vital Statistics Analyst, Metropolitan Life Insurance Company. Read in preliminary form before the Section on The Family of the Eastern Sociological Society at the Nineteenth Annual Meeting in New York, N. Y., April 23, 1949. This paper is based on research for a doctoral dissertation in the Department of Sociology, Columbia University.

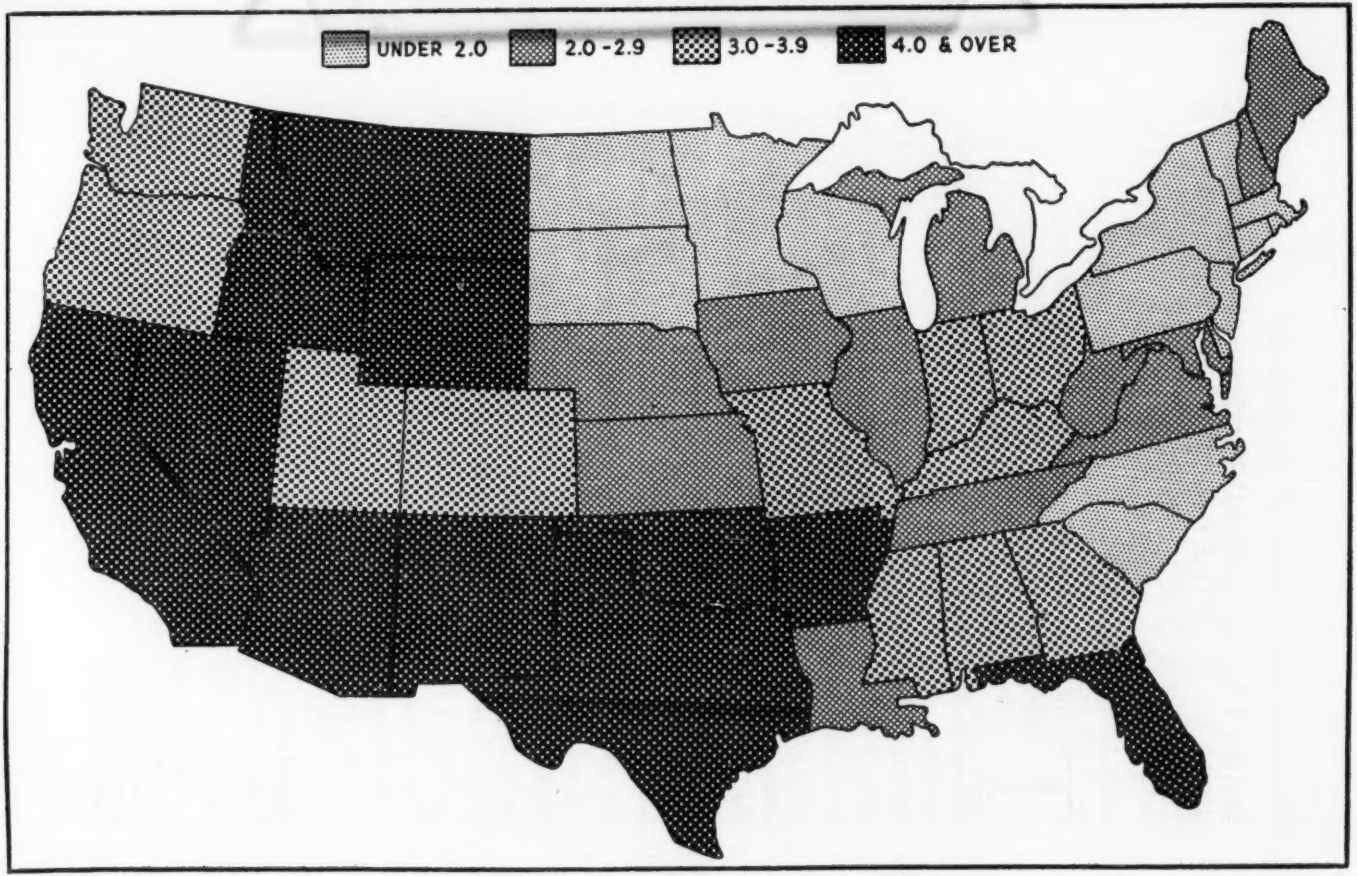

Figure 1. Marital dissolutions by divorce or annulment per 1,000 estimated civilian population, 1948.
NOTE: Final data for Illinois, available after this map was prepared, raised the rate from 2.8 to 3.0.

tabulate detailed statistics; others make no statistical tabulations at all. The situation is even more chaotic in other states where divorce actions may be tried in as many as four different courts in a single county, each court retaining its own records. The data for this paper were computed from information gathered by questionnaire from fifty-two of the sixty-two counties in New York State, and from a majority of the courts and counties in other states for which information has not been available since 1940. Thus, the figures from 1940 forward do not necessarily agree with those published by the National Office of Vital Statistics. Their data have been supplemented with information obtained from state, county and court offices in the forty-eight states and the District of Columbia.[2]

Legal Dissolutions of Marriage in 1948

In the United States, in 1948, about 421,000 marriages were legally dissolved by divorce or annulment. This is one seventh below the figure for 1947, and one-third less than the all-time high of 628,000 in 1946. Despite this marked drop from the previous two years, the rate of marital dissolutions in 1948 was still the fifth highest in our history, exceeding the rate for every year prior to 1944. The rate in 1948 was 2.9 per 1,000 total population, compared with 4.4 in 1946 and 3.0 in 1944.

The frequency of marital dissolutions is not uniform throughout the country, but varies considerably from region to region. This is clearly evident from Figure 1 which shows the marital dissolutions in 1948 per 1,000 civilian population in each state.[3]

[2] Acknowledgments are made to those who cooperated in providing the basic data for this paper. They include 524 court clerks, 119 county clerks, 33 State directors of vital statistics, The State Judicial Councils for Kansas and Texas, the Secretaries of State for Massachusetts and Ohio, the Division of Procedural Studies and Statistics of the United States Courts, the Family Service Association of America, the Marriage and Divorce Law Committee of the Missouri Bar, the Superior Court of New Jersey, the Department of Justice of the State of North Carolina, the *Nevada State Journal*, the *Record* Newspapers of Troy, New York, and Judge Edwin A. Robson of the Superior Court of Cook County, Illinois.

[3] It is recognized that dissolution rates should be computed on the basis of the married population in each state, but the latter figures are not available for other than Census years. Undoubtedly, the rank of the states according to such refined rates would be changed somewhat, but the basic pattern would not be affected. Detailed statistics on divorce and annulment for the country as a whole will be published in a future paper.

Nevada, in 1948 as in previous years, was far ahead of all other states, with 71 divorces for each 1,000 population. This figure, of course, does not reflect the divorce rate among long-term residents of Nevada since the great majority of that State's decrees are granted to couples who migrate from other states temporarily to take advantage of the liberal divorce requirements of Nevada.

At the other extreme, South Carolina stands unchallenged with only 0.1 dissolutions per 1,000 population. Before 1949, that State did not grant divorce, so the rate refers to annulments only. It is of interest to note, however, that since April 1949 South Carolina has had legislation permitting divorce on grounds of adultery, desertion, physical cruelty, or habitual drunkenness.

Between Nevada, on the one hand, and South Carolina on the other, the country in 1948 divided into three fairly well-defined groups of states according to their divorce and annulment record. Most of the Mountain States, and California, Texas, Oklahoma, Arkansas, and Florida had the highest rates; the Eastern States extending from Vermont to Delaware, as well as the Dakotas, Minnesota, Wisconsin, and North Carolina had the lowest rates. The remaining states fell between the other two groups. In general, the frequency of marital dissolutions tended to increase as one moved from East to West, and from North to South.

Focusing attention on the Northeastern States, however, we find that Maine and New Hampshire had relatively high rates with the result that the dissolution rate for the region varied from as low as 1.0 per 1,000 in New York State to as much as 2.5 in Maine. In all of these States the rate was well below the national average. Indeed, in 1948, the rate in New York was only a third of the rate for the United States as a whole.

Trend of Marital Dissolutions

Figure 2, plotted on a semi-logarithmic scale, compares the trends in marital dissolutions in New York State and in the

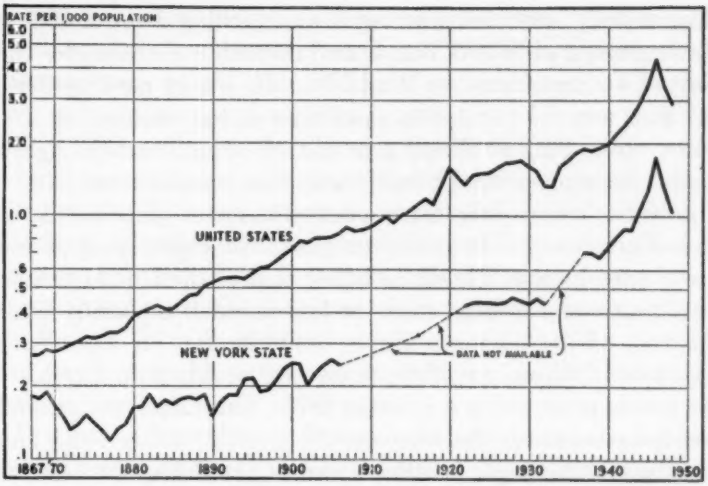

Figure 2. Marital dissolutions by divorce or annulment per 1,000 estimated population, United States and New York State, 1867–1948.

country as a whole from 1867 to 1948.[4] There is evident a steady rise over the years in the dissolution rate both for the United States and for New York State. For the country as a whole, the rate immediately after the Civil War was less than 0.3 per 1,000 population. In the years that followed, the rate

[4] There are certain limitations in these data. The curve for the United States from 1867 to 1939 is based on data which include limited divorces. So far as possible these limited decrees are not included in the data from 1940 on. (For example, the District of Columbia grants limited divorces which are not "temporary" in the usual sense since they may be enlarged on motion after two years. An "extension" of a limited decree does not constitute a new divorce nor become a "duplicate" frequency in the statistics for the District. While it is unlikely that all limited decrees are eventually "extended"—data are not available on the number of limited decrees made absolute—these limited divorces have been included in the statistics for the years in which they were granted in order to conform with the procedure used by the National Office of Vital Statistics. Although these limited decrees have increased from 92 in 1940 to 245 in 1948, in no year have they constituted as much as 13 per cent of the total decrees granted in the District.) In addition, annulments were not tabulated prior to 1926, so they are not included in the rates for the earlier years. However, since annulments play an important role in New York State, as will be shown in a later section, the rates for New York include estimates of annulments from 1922 to 1925, to be comparable with the data for later years. The New York data, published by the Bureau of the Census, were also adjusted to exclude limited divorces for the period 1922 to 1939. Thus, the curve for New York is based on absolute and limited divorces from 1867 to 1906, and on absolute divorces (including Enoch Arden decrees) and annulments from 1922 to 1948; data are not available for 1907 to 1915, 1917 to 1921, and 1933 to 1936.

rose steadily with few interruptions, reaching 1 per 1,000 at the beginning of World War I, and thereafter doubling by the time of our entrance into World War II. At its peak in 1946, the rate was 4.4 per 1,000; since then it has declined to 2.9. Thus, from 1867 to 1948, a period of approximately eighty years, the rate in the United States has increased ten-fold.

So far as can be judged, the pattern has been quite similar in New York State. The rate throughout the eighty-year period has always been at a level far below that of the United States, but the trend has been more or less parallel, especially since the turn of the century. Up to 1893 the rate in New York fluctuated without any definite upward or downward trend—the lowest point being reached in 1877. Thereafter, the general trend was upward; the rate was 0.4 in 1922, 0.7 in 1940, and 1.8, the all-time high, in 1946. Further paralleling the relative changes in the rate for the United States, the rate in New York declined in 1947 and in 1948, dropping to 1.0 per 1,000 population in 1948.

Deviations from Trend

Although the divorce rate has moved upward fairly uniformly, there have been several marked deviations from the long-term trend. This is well illustrated by the data for the United States. Prominent peaks appeared after the two World Wars.[5] Apparently, hasty courtship, long separation, and the general difficulty of readjustment to postwar life lead to instability in many war marriages. This is amply documented by the recent upswing in the dissolution rate and the fact that the rise was sharpest among those married less than five years—essentially those married during the war. From 1941 to 1946 the probability of divorce or annulment within the first five years of marriage more than doubled. The rate increased also among couples whose marriage had lasted beyond the early, critical years, but the relative rise was progressively smaller

[5] A similar divergence from the trend is also evident during the Civil War period in Ohio, Massachusetts, and Connecticut.

for each successive five years of marriage.[6] In fact, with a continuance of the peak rates recorded in 1946, two out of every five marriages would end in divorce or annulment. But the 1946 rate has not persisted; the rate declined sharply in 1947 and in 1948, and undoubtedly will decline further in the near future. As one County Clerk in New York State put it: "Apparently the G.I.'s are getting down to earth again." The current drop, therefore, does not mean that the long-term upswing has been reversed; more likely the decline is a temporary phenomenon similar to the decreases which followed previous postwar booms. In fact, it would not be surprising if the divorce rate resumed its historic upward trend in the 1950's, though perhaps at a lesser rate of increase.

Divorce and annulment decline in frequency also during periods of financial crisis. The depression of the 1930's is the best illustration of this phenomenon. Undoubtedly, the inability to pay the costs of court litigation and alimony is a factor in the decline of marital dissolutions during periods of deflation. But that is not the only factor. Estimates for the United States indicate that the probability of marital dissolution dropped sharply during the 1930's among couples married only a relatively short time. The rate also declined among families of longer standing, but the relative decline was smaller, especially for those married 5 to 19 years. Moreover, the decline appears to have persisted for one year longer for those married less than five years, and in both 1933 and 1934 the newlywed group had a lower dissolution rate than the couples married 5 to 9 years. It seems likely, therefore, that part of the decline in divorce during depressions is due to the curtailment of hasty marriages —an effect opposite to that in war periods. In other words, couples who marry in hard times are more sure of themselves, because of longer courtship, more intelligent selection, and sim-

[6] Jacobson, Paul H.: "Total Marital Dissolutions in the United States: Relative Importance of Mortality and Divorce," a paper read before the Population Association of America at the Annual Meeting in Princeton, N. J., May 28, 1949. *See* Mair, George F. (Editor): STUDIES IN POPULATION. Princeton, Princeton University Press, 1949, pp. 3–15.

Table 1. Marital dissolutions by divorce or annulment per 1,000 population, United States, 1940–1948.

Geographic Region and State	Rate per 1,000 Estimated Civilian Population									Per cent Change		
	1940	1941	1942	1943	1944	1945	1946	1947	1948	1948 Since 1946	1948 Since 1940	1946 Since 1940
United States[1]	2.0	2.2	2.4	2.8	3.3	3.8	4.5	3.4	2.9	– 36	45	125
New England	1.2	1.3	1.4	1.4	1.7	1.9	2.6	2.2	1.7	– 35	42	117
Maine	1.8	2.1	2.2	2.3	2.8	3.2	4.6	3.3	2.5	– 46	39	156
New Hampshire	1.4	2.1	2.0	2.0	2.1	3.1	4.1	2.7	2.4	– 41	71	193
Vermont	1.2	1.2	1.4	1.6	1.7	2.0	2.9	2.1	1.4	– 52	17	142
Massachusetts	1.1	1.1	1.3	1.3	1.6	1.7	2.3	2.2	1.7	– 26	55	109
Rhode Island	.9	1.0	1.1	1.1	1.4	1.7	2.1	2.1	1.1	– 48	22	133
Connecticut	1.0	1.2	1.4	1.2	1.3	1.5	2.0	1.7	1.4	– 30	40	100
Middle Atlantic	.9	.9	1.0	1.1	1.2	1.5	2.1	1.6	1.4	– 33	56	133
New York[2]	.7	.8	.9	.9	1.1	1.3	1.8	1.3	1.0	– 44	43	157
New Jersey	.9	1.0	1.1	1.1	1.3	1.4	1.8	2.0	1.5	– 17	67	100
Pennsylvania	1.0	1.1	1.2	1.3	1.5	1.7	2.6	2.0	1.7	– 35	70	160
East North Central	2.2	2.5	2.6	2.9	3.4	3.9	4.7	3.5	2.9	– 38	32	114
Ohio	2.4	2.6	2.7	3.1	3.5	4.2	5.0	3.7	3.3	– 34	38	108
Indiana	2.4	3.3	3.5	3.7	4.5	5.2	5.9	4.3	3.6	– 39	50	146
Illinois	2.2	2.4	2.6	2.9	3.3	3.8	4.5	3.5	3.0	– 33	36	105
Michigan	2.3	2.5	2.7	2.9	3.4	3.9	5.0	3.5	2.6	– 48	13	117
Wisconsin	1.1	1.3	1.3	1.5	1.8	2.2	2.6	1.8	1.5	– 42	36	136
West North Central	1.9	2.2	2.3	2.6	3.0	3.6	4.6	3.1	2.5	– 46	32	142
Minnesota	1.1	1.2	1.2	1.2	1.5	2.0	2.8	2.0	1.6	– 43	45	155
Iowa	1.9	2.0	1.9	2.2	2.6	3.2	3.9	2.6	2.1	– 46	11	105
Missouri	3.0	3.5	3.9	4.4	4.9	5.8	7.1	4.6	3.8	– 46	27	137
North Dakota	.8	.9	.8	1.0	1.1	1.5	1.9	1.5	1.2	– 37	50	138
South Dakota	1.2	1.2	1.2	1.6	1.8	2.3	2.8	2.2	1.7	– 39	42	133
Nebraska	1.6	1.7	1.5	1.9	2.2	2.8	3.6	2.6	2.2	– 39	38	125
Kansas	2.1	2.4	2.4	2.8	3.1	4.1	4.9	3.5	2.9	– 41	38	133
South Atlantic	1.8	2.0	2.2	2.7	3.1	3.6	4.4	3.3	2.9	– 34	61	144
Delaware	.8	1.1	1.5	1.6	1.4	1.9	1.2	2.6	1.4	17	75	50
Maryland	1.8	2.2	2.8	3.0	3.3	3.6	4.1	3.2	2.8	– 32	56	128
District of Columbia	2.0	2.0	2.2	2.1	1.5	2.2	2.9	2.5	2.3	– 21	15	45
Virginia	1.5	1.7	1.9	2.2	2.5	2.7	3.2	2.4	2.4	– 25	60	113
West Virginia	1.5	1.8	1.7	2.0	2.5	3.3	4.4	2.8	2.5	– 43	67	193
North Carolina	1.1	1.2	1.3	1.6	1.7	2.0	2.5	1.9	1.7	– 32	55	127

South Carolina	*	*	.1	.1	.1	.1	.1	.1	.1	**	**	**
Georgia	1.5	1.8	2.0	2.6	3.3	4.0	5.8	4.1	3.4	-41	127	287
Florida	5.9	6.1	6.4	8.5	10.0	11.1	12.1	9.2	7.5	-38	27	105
East South Central	1.8	2.1	2.4	3.0	3.6	4.2	5.1	3.6	3.1	-39	72	183
Kentucky	2.1	2.4	2.5	3.1	3.7	4.2	5.4	4.2	3.4	-37	62	157
Tennessee	1.9	2.0	2.3	3.0	3.5	4.2	4.7	3.1	2.6	-45	37	147
Alabama	1.6	2.0	2.6	3.3	4.0	4.9	5.4	3.8	3.4	-37	113	238
Mississippi	1.5	1.7	2.0	2.8	3.3	3.3	4.7	3.4	3.2	-32	113	213
West South Central	3.5	4.1	4.6	5.3	5.9	7.0	7.3	5.5	4.8	-34	37	109
Arkansas	2.8	4.1	5.1	4.0	5.6	7.0	7.6	5.4	4.9	-36	75	171
Louisiana	1.4	1.6	2.3	2.9	2.8	2.9	2.7	2.5	2.0	-26	43	93
Oklahoma	4.2	5.5	5.2	6.6	7.8	8.9	8.3	6.3	5.8	-30	38	98
Texas	4.3	4.5	5.0	6.1	6.6	7.9	8.6	6.3	5.5	-36	28	100
Mountain	4.1	4.2	5.0	6.5	7.5	9.3	11.4	8.1	6.6	-42	61	178
Montana	3.0	3.1	3.0	4.0	3.9	5.4	6.7	5.0	4.1	-39	37	123
Idaho	3.1	3.6	4.2	5.0	5.5	6.8	8.6	6.9	5.4	-37	74	177
Wyoming	4.0	3.5	2.9	3.8	4.5	5.6	6.5	5.6	4.5	-31	13	63
Colorado	2.5	2.1	2.5	2.7	3.4	3.9	5.5	4.1	3.5	-36	40	120
New Mexico	2.2	2.1	2.7	4.0	4.9	6.7	7.5	5.9	4.7	-37	114	241
Arizona	3.4	3.8	4.2	5.3	5.9	7.6	7.8	6.0	5.2	-33	53	129
Utah	2.7	2.4	2.5	3.4	3.5	4.6	5.5	4.0	3.3	-40	22	104
Nevada	49.4	55.0	68.8	88.2	105.5	129.5	157.5	98.6	70.5	-55	43	219
Pacific	3.3	3.5	3.6	4.0	4.5	5.2	5.5	5.0	4.0	-27	21	67
Washington	3.7	3.8	4.0	4.4	4.8	5.2	5.9	4.3	3.5	-41	-5	59
Oregon	3.2	3.6	4.1	4.8	5.2	6.1	7.2	4.3	3.9	-46	22	125
California	3.3	3.4	3.5	3.8	4.4	5.0	5.2	5.3	4.2	-19	27	58

[1] The rates for the United States based on the total population including armed forces overseas were 2.6 in 1943, 3.0 in 1944, 3.5 in 1945, and 4.4 in 1946.

[2] Includes dissolutions of marriage (Enoch Arden decrees).

* Less than 0.05 per 1,000.

** Not computed.

SOURCE: Basic data obtained through inquiries to state, county, and court offices by the Statistical Bureau, Metropolitan Life Insurance Company. For a number of states, the basic data include estimates for counties which failed to provide information.

ilar reasons. Of course, the number of marital dissolutions and the rate per 1,000 total population decline in part during a depression from the very fact that fewer marriages occur.

As would be expected, periods of prosperity exert an opposite influence on the dissolution rate. Thus, we find that the rate rose in the United States with improvement of economic conditions in the years preceding Pearl Harbor.

Now the question arises whether these phenomena have had a comparable effect on the dissolution rate in New York State. Investigation of this question cannot be documented thoroughly due to the absence of detailed data, and other factors which enter into the situation, such as fluctuations in the extent of migratory divorce. For example, Willcox explains the sharp drop in the New York rate from 1876 to 1878, as due to the large number of New Yorkers who flocked to Utah to take advantage of the liberal requirements in Utah's divorce law for those years.[7] The gaps in the New York data for the critical years during World War I and the depression of the 1930's do not enable us to examine the course of the rate during those periods. However, since the rate from 1937 to 1939 was at a much higher level than from 1930 to 1932, it is evident that there was an upward trend with improved economic conditions.

We are on much safer ground in evaluating the effect of World War II on the dissolution rate in New York. For this period, it is apparent from Table 1 that the trend in New York approximated the national pattern. In the nation, the rate in 1946 was two and one-quarter times that for 1940,[8] while in New York it was two and one-half. Moreover, in both the nation and State, the rate in 1948 was about two-fifths above the 1940 level. Thus, the war and economic conditions of recent years have had the same effect on marital dissolutions in New York as in the other states.

In view of the stringent New York divorce law, let us ex-

[7] Willcox, Walter F.: The Divorce Problem: a study in statistics. New York, Columbia University, 1897, pp. 53–54.

[8] Based on civilian population, for comparability with the trend in New York State.

amine in greater detail the recent data for the State to explain the similarity in its trend to that of the country as a whole.

The Role of Annulments in New York

Four types of matrimonial dissolutions may be granted in New York, namely, absolute divorce, dissolution of marriage, annulment, and limited divorce (Table 2). At this point, we will restrict ourselves to the first three of these actions—those

Table 2. Number of matrimonial decrees granted in New York State, 1940–1948.

Area and Type of Decree	1940	1941	1942	1943	1944	1945	1946	1947	1948
New York State									
Absolute Divorce	7,220	7,640	7,970	7,640	9,050	10,770	15,040	11,750	9,810
Dissolution of Marriage[1]	590	570	810	700	810	900	980	860	680
Annulment	2,210	2,650	2,830	2,780	3,280	4,330	8,110	5,580	4,760
Limited Divorce	600	630	680	640	800	850	940	1,110	1,000
New York City									
Absolute Divorce	3,532	3,743	3,984	3,519	4,274	4,832	6,956	6,176	4,481
Dissolution of Marriage[1]	262	327	418	451	520	554	630	571	474
Annulment	1,143	1,263	1,579	1,408	1,738	2,208	3,851	3,185	2,788
Limited Divorce	306	364	389	349	397	386	445	651	667
Buffalo (Erie County)									
Absolute Divorce	460	466	457	501	616	705	892	561	549
Dissolution of Marriage[1]	166	93	203	70	79	90	73	34	31
Annulment	399	587	377	475	476	512	1,121	380	282
Limited Divorce	69	51	51	49	94	111	80	68	81
Rest of State[2]									
Absolute Divorce	3,228	3,431	3,529	3,620	4,160	5,233	7,192	5,013	4,280
Dissolution of Marriage[1]	162	150	189	179	211	256	277	255	175
Annulment	668	800	874	897	1,066	1,610	3,138	2,015	1,690
Limited Divorce	225	215	240	242	309	353	415	391	342

[1] Enoch Arden decrees.

[2] Includes estimates for ten counties from which no information was obtained—Albany, Monroe, Niagara, Otsego, Putnam, Schoharie, Schuyler, Seneca, Sullivan and Tompkins.

that permanently dissolve a marriage. Limited divorces, or separations as they are commonly called, will be discussed in a later section.

Absolute divorce may be granted in New York for adultery only. From 1940 to 1948, these decrees averaged 9,600 a year. They reached a peak of 15,000 in 1946, double their number in 1940.

A marriage may also be dissolved in New York if a spouse is absent for five years and presumed to be dead. These dissolutions of marriage or Enoch Arden decrees, which are included with divorce in other states, amounted to only 770 per year from 1940 to 1948, or to less than one for every twelve decrees granted for adultery. Obviously, these decrees are too few to affect materially the total dissolution rate in the State.

In addition, a marriage may be dissolved in New York by annulment. In the country as a whole, annulments have constituted only a small proportion of the total legal dissolutions. At the peak in 1946, when close to 22,000 annulments were granted in the United States, they represented only 3.5 per cent of the total. In California and New York, however, they were of much greater importance. Thus in California, annulments constituted somewhat more than one-ninth of all legal marriage dissolutions in 1948. In New York they were an even larger proportion of the total; almost one quarter of the marital dissolutions in 1940, and since 1946 almost one third. In at least five counties[9] in New York, the number of annulments now exceeds the number of absolute divorces. Moreover, in the nine years from 1940 to 1948, an average of 4,060 annulments per year were granted in New York State; almost one-third of the total in the United States.

Thus, it is evident that annulment is a method frequently used for dissolution of marriage in New York. This is not surprising since the grounds for annulment provided by the State's law are relatively broad in scope. They include force, duress,

[9] In 1948, these counties were Columbia, Greene, Orleans, Richmond, and Wyoming.

fraud, bigamy, incurable physical incapacity, non-age, want of understanding, and incurable insanity.

Unfortunately, the New York data regarding annulment and divorce are not available by duration of marriage. However, since the great preponderance of annulments in the country as a whole are granted in the first five years of marriage, it seems reasonable to assume that this is also the case for annulments granted in New York. Certainly, this would help to explain the fact that the dissolution rate in New York followed closely the United States trend in the war and early postwar years. In other words, it is very likely that annulments served as the primary vehicle for dissolving unstable war marriages, and that divorces were used principally for dissolving marriages of longer duration.

Effect of the New York Law

The divorce problem has been the subject of as much or more controversy in New York than in any other of the forty-nine legal jurisdictions in the United States. The State's divorce law dates back to 1787, when the legislature first established divorce on the grounds of adultery. Over the years there have been some modifications and additions to the law. In the original Act, for example, the defendant was forbidden to remarry. Today, remarriage is permitted after three years. The problem of remarriage, however, is still important since many divorced New Yorkers remarry in Connecticut and in other neighboring states.

The second basic step in constructing New York's divorce statutes occurred in 1813, when the Revised Laws originated the remedy of separations or limited divorces. This remedy was at first restricted to the wife, and it was not until 1880 that the right was definitely made applicable to husband and wife alike. Other important changes in the New York laws include the addition of Enoch Arden decrees in 1922, and the liberalization of the residence requirements for all types of matrimonial actions. However, the greatest advance in New York has un-

doubtedly come not through the evolution of the law itself, but rather through the fact that the courts have taken a more liberal attitude toward interpretation and application of the law. At least this was true until the recent perjury investigations in New York County.[10] In the large counties in New York, official referees appointed by the court handle the great majority of matrimonial actions. Prior to December 1948 the courts accepted, almost without review, the recommendations of these referees.[11]

Attempts to amend and "liberalize" the New York divorce law have been made in various forms, both direct and indirect. New York took the initiative toward the end of the 19th century in petitioning for national uniform divorce legislation. In the 1930's, attempts were made to amend the law directly in the State Legislature. Since 1945, the Association of the Bar of New York City has sponsored and endorsed a number of suggested revisions of the law, but without success. Indeed, in the 1949 session of the State Legislature a resolution was introduced in the Assembly proposing a commission to study the causes and effects of matrimonial problems, and to recommend changes in the State law. Even this proposal for an inquiry, which is many steps removed from actually changing the law, was killed in the Assembly Ways and Means Committee.

Available statistics and numerous newspaper articles make it clear that New Yorkers often establish temporary residence in other states in order to secure divorce. No precise measure of the extent of these migratory divorces is available. On the basis of data on the place of marriage of those divorced in 1922, Cahen estimated that about 30 per cent of all divorces granted to New Yorkers were obtained outside the State.[12] This esti-

[10] On November 30, 1948, New York District Attorney Frank S. Hogan announced the arrest of six members of an alleged "divorce ring" on charges of perjury and subornation of perjury, and thereafter a grand jury investigation was launched of all uncontested matrimonial actions disposed of during the preceding two years.

[11] A decision by the Appellate Division on May 25, 1949 may actually accelerate the trend toward uncontested annulments in the State. It appears that the decision virtually strips Supreme Court justices of authority to refuse an annulment, once a referee has made such a recommendation.

[12] Cahen, Alfred: STATISTICAL ANALYSIS OF AMERICAN DIVORCE. New York, Columbia University Press, 1932, p. 68.

mate is at best an educated guess since Cahen allowed for New Yorkers who migrate to other states to establish permanent residence, but did not take into account those citizens of other states who move to New York after marriage. Statistics for a series of years from 1916 to 1938, showing the place of divorce for persons remarrying in upstate New York, confirm Cahen's conclusion that a sizable proportion of New Yorkers secure divorce in other jurisdictions.[13] These data are similarly affected by migration, and also by the fact that many New Yorkers who go to Reno, for example, remarry there after their divorce. In the absence of valid information we can only speculate on the true extent of marital dissolutions among New Yorkers. Undoubtedly, however, it is of significant magnitude; perhaps as much as one-third to one-half greater than the number recorded in New York State. Then, too, it is probable that some persons, without the financial means of migrating to other jurisdictions, give up attempts to dissolve their "broken" marriages. It is also likely that many others take the "poor man's out," and desert their families, or partially resolve their difficulties by securing a limited divorce in the State.

Limited divorces may be granted in New York on the grounds of extreme cruelty, desertion, and non-support by husband. Apparently, however, relatively few New Yorkers apply for these decrees since the number granted has averaged only 820 per year. Their number varied from as low as 600 in 1940 to 1,100 in 1947 and 1948 (Table 2).

The low dissolution rate in New York has often been attributed to the State's large population of Catholics and the foreign-born. This factor, however, does not appear to explain completely New York's divorce record. The population in Massachusetts, Illinois, and Pennsylvania also includes a large proportion of such persons, yet in each of these States the recorded divorce rate is higher than New York's. In Massachusetts, for example, the rate in the past nine years was one

[13] Fifty-eighth Annual Report. New York State Department of Health, vol. 2, page 262 for 1937, and earlier reports for years prior to 1937; data for 1938 tabulated but not published.

and one-half times what it was in New York. Massachusetts, of course, has a more liberal divorce law; absolute decrees may be granted on seven different grounds.

The situation in New York also contrasts sharply with that in Virginia. There, for example, the recorded rate of legally dissolved marriages is double the New York rate, and bed and board (separation) decrees average two and three-quarter times the number of limited divorces granted in New York. For all of the states in the country, however, there does not appear to be any relationship between the frequency of separation decrees and the dissolution rate. Census data on the marital

Table 3. Divorced or separated[1] persons as per cent of those ever married (excluding the widowed), white population, 15 years of age and over, United States and New York State, 1940.[2]

Age	White Males						White Females					
	Divorced		Separated[1]		Divorced or Separated		Divorced		Separated[1]		Divorced or Separated	
	United States	New York	United States	New York	United States	New York	United States	New York	United States	New York	United States	New York
15 & Over[3]	1.8	0.9	6.5	9.9	8.3	10.8	2.4	1.4	4.7	6.4	7.1	7.8
15–19	1.0	.9	20.9	38.4	21.9	39.3	1.2	.4	7.1	8.7	8.3	9.1
20–24	1.1	.4	5.8	7.1	6.9	7.5	1.8	.7	4.5	5.1	6.3	5.8
25–29	1.4	.6	3.8	4.4	5.2	5.0	2.3	1.2	3.6	4.5	5.9	5.7
30–34	1.8	.9	3.4	4.2	5.2	5.1	2.9	1.8	3.5	4.7	6.4	6.5
35–39	2.2	1.1	3.7	4.7	5.9	5.8	3.3	2.1	3.7	5.2	7.0	7.3
40–44	2.4	1.2	4.0	5.4	6.4	6.6	3.2	2.0	3.9	5.5	7.1	7.5
45–49	2.3	1.2	4.1	5.7	6.4	6.9	2.9	1.8	4.1	5.9	7.0	7.7
50–54	2.4	1.1	4.5	6.2	6.9	7.3	2.7	1.6	4.4	6.3	7.1	7.9
55–59	2.3	1.1	4.6	6.4	6.9	7.5	2.5	1.5	4.6	6.7	7.1	8.2
60–64	2.2	.9	4.7	6.6	6.9	7.5	2.3	1.3	4.8	7.1	7.1	8.4
65–69	2.2	.9	4.9	7.0	7.1	7.9	2.1	1.2	5.4	8.1	7.5	9.3
70–74	2.0	.8	5.1	7.3	7.1	8.1	1.9	1.1	6.1	9.6	8.0	10.7
75–79	1.9	.8	5.9	8.5	7.8	9.3	1.9	1.0	8.3	12.6	10.2	13.6
80–84	1.7	.6	7.0	10.3	8.7	10.9	2.0	.9	13.0	19.2	15.0	20.1
85 & Over	1.8	.8	10.2	14.9	12.0	15.7	2.7	1.2	24.6	32.9	27.3	34.1

[1] Married, spouse absent.

[2] Basic data from POPULATION, Vol. IV, 1940 Census, United States—Tables 6 and 9, pp. 17 and 25, New York—Tables 7 and 11, pp. 23 and 38. Washington, D. C., Bureau of the Census, 1943.

[3] Standardized for age on the basis of the age distribution of the total population in the United States, 1940.

status of the white population in the United States in 1940 also indicate no correlation between the proportions divorced and separated in the individual states.

Although relatively few New Yorkers obtain limited divorces in the State, informal separations are apparently frequently resorted to (Table 3). For example, in the Census of 1940 the proportion of the white women ever married (excluding widows) reported as living apart from their husband was one-third greater in New York than in the country as a whole. By contrast, New Yorkers were less frequently reported as divorced than the national average.

When using Census reports as an index of marital disruptions, it is important to recognize certain limitations in the data. First, persons who are divorced or separated are likely to be attracted to large urban centers. New York City, especially, is a magnet for these people. Then, too, the figures relate to persons divorced and not remarried, so that geographic differences in the rate of remarriage undoubtedly affect the data. Finally, the data understate the true situation in New York since a sizable proportion of marital dissolutions in that State are by annulment, and annulees are classified as single persons in Census reports.

With these limitations in mind, we can consider the total frequency of marital disruptions in 1940 among white persons, 15 years of age and over. The index used is the proportion divorced or separated of those ever married, excluding the widowed. Judged by this criterion, New York State is above the national average, even if the data are not inflated to allow for annulees. Among women, the age-adjusted proportion is 7.8 per cent in New York, as compared with 7.1 per cent in the United States as a whole. The disparity is even more pronounced among white men, 10.8 per cent in New York and 8.3 per cent in the United States.[14]

[14] Judged by the 1940 Census data for white women, thirty-four states have a smaller proportion divorced or separated than New York; for white men, thirty-nine states.

Thus, it is evident that although the recorded rate of marital disruptions in New York is the second lowest in the country, migratory divorces, separations and desertions raise the total disruptions above the national average.

THE LIBERIAN FOUNDATION: AIMS AND METHODS

STANLEY J. LELAND, M. D.[1]

THE Liberian Foundation was a concept of Mr. Edward R. Stettinius, following his visit to Liberia in 1946. He was convinced that when a large corporation enters a comparatively undeveloped country, it has a duty toward the people of that country beyond the economic prosperity which may follow. His concept was one of great breadth in that it visualized the modernization of an entire country through the medium of education.

The proposal which Edward Stettinius and his associates offered to the Republic of Liberia, included these words: "The objective of the Liberia Company is to develop all the resources of Liberia—natural, agricultural, commercial—and, at the same time bring along in parallel steps, the improvement of health, education, and living conditions of the people. . . ."

This objective led to the formation of the Liberian Foundation, the instrument through which the Liberian Government and the Liberia Company planned to carry forward the social development of the Republic. At the time the Liberia Company was being organized, this Foundation, a separate corporate entity, was presented with ten per cent of the stock of the Liberia Company, while twenty-five per cent of the stock was also given to the Government of Liberia. The Foundation was expected to derive the remainder of its operating capital from other sources.

As its primary field, the Foundation selected the problems of health and education. Even before the results of increased industry should be felt, it would begin activities in these fields. It would not, of itself, build any of the necessary structures required to realize the aim of sound, country-wide, educational and medical facility. It would not produce an operative institution in either of the fields, except for purposes of demonstration, but would support and further the already existing insti-

[1] Director, The Liberian Foundation.

tutions, promoting their modernization in both structure and functions. It would introduce new facilities, integrating all of these organizations into a nationwide functioning group.

In a word, the Foundation would be an informative and coordinating agency. It would explore the needs of Liberia in the education and health fields, and by the presentation of these to specific organizations, would endeavor to interest such groups to participate in the social development of the country. In collaboration with interested groups, the Foundation would then endeavor to produce a progressive program of development which would satisfy the immediate needs of Liberia and which would also be capable of meeting the requirements of a rapidly expanding economy in the industrial and agricultural resources of the country, but with provision made from the beginning for outside support for such portions of the program as would exceed the Government's capacity to carry on.

The necessity for thus acting as a catalytic agent is dictated by the cost of the overall educational and medical plan for Liberia.

In education, a planned primary program is the first necessity and there is the problem of introducing students from the hinterland to the official language of the country—English. The aboriginal people of Liberia comprise about ten ethnic groups divided into some twenty-two tribes, each with its own language or variant dialect; its own customs; its own religious observances.

Not only is it necessary to effect a standard curriculum in the Government primary school system, but it is an equally essential task of the Foundation to obtain the cooperation of the religious mission groups in bringing about standardization within the primary schools which they operate.

Indeed, as an initial step, the religious school groups must be incorporated into one over-all system of its own. (The Foundation has already had some success in this.) The secondary and higher educational levels offer the same problem—a lack of planned curriculum leading progressively to recognized higher

educational requirements. With the single exception of Liberia College in Monrovia, education at these higher levels is offered only in church-supported schools.

While at the present time the institutional facilities are large enough to accommodate the number of available students, the training is inadequate. Such instruction as is received is not recognized on a parity basis by institutions in other countries, nor can specialty training, notably in the sciences, be received at all. For a student who aspires to a college education of American or European standard, it is therefore necessary, at present, to begin education abroad at pre-high school level.

Plans for the future call for the establishment of two hundred Government primary schools, a secondary school in each district; in each of the three provinces several high schools placing emphasis on vocational training; and, for the nation, one major college and two teacher training institutions.

This last, brings us to one of Liberia's greatest current needs; the trained instructor. There is a paucity of vocational training, including agricultural methods, and an almost complete absence of students for the scientific groups. Eventually, the level of training must be equal to that of the more progressive nations, and must be acceptable by them. Fortunately, it is not necessary to persuade the Liberian Government of the wisdom of this educational program. The religious groups also are now working with this educational program in view.

The Government operates 107 schools and there is at least a primary school at each of the sixty-four religious missions throughout the country. It is the view of the Foundation that ultimate responsibility for the nation's educational system rests with the Government, so that, whatever progress is made by the religious missions, their schools must some day come into the sphere of Government responsibility.

Such an educational program would demand a capital outlay in excess of $5,000,000, and realization would seem to require a grant to the Government for this purpose. While industry may assist by the establishment of demonstration schools

utilized as teacher training centers—later to be vested in Government control—this is only a beginning step. Thus to effect such a program as outlined we find the Foundation acting as a salesman for Liberia, promoting the establishment of a national school system of higher level, and in the interim seeking to make available many scholarships for study abroad; in order to create a group of leaders in the educational and scientific fields. Some eighty grants have already been established by the Liberian Government itself, and a few additional ones have been provided by certain religious groups and the United States Public Health Service.

The requirements of the health situation can be somewhat more concisely delineated. This was the subject of intensive study during my initial ten-months residence in the country.

The Government of Liberia, let me say at the outset, is not only ambitious for the development of the country, but is well aware of the fact that a high standard of public health must be developed and maintained. More than 15 per cent of each year's Government budget has gone to this purpose—a remarkably generous proportion in comparison with other countries.

Liberia has a Department of Sanitation and Public Health, in the hands of a physician director and a small clerical staff. In addition to problems of public health within the capital city of Monrovia, it supervises some eleven outlying dispensaries scattered throughout the country, and the 60-bed Government hospital in Monrovia. The Government hospital is staffed by four foreign physicians under Government contract, while four other physicians, also foreign and likewise under Government contract, are stationed at the out-patient facilities in other parts of the country.

Some assistance has been given to the Liberian Government in matters of health. During the war years the United States Public Health Service maintained a Mission based in Monrovia, and this Mission continues now under the auspices of the United States Department of State. This Mission has established a free out-patient clinic in Monrovia, which it now

operates jointly with the Liberian Public Health Department. It has also made possible improved nurses' training and the building of a school for nurses as well as improved clinical laboratory facilities and methods, and has conducted some disease incidence survey work.

Currently, the Mission's activity includes carrying on a small tuberculosis incidence survey among school children, as well as manifold assistance and guidance to the Liberian Public Health Department.

The remainder of health activity in Liberia rests in the hands of the religious missions which operate five hospitals, two of them under the direction of physicians, as well as some thirty-five dispensaries, eight of which are under the direction of graduate nurses. The remainder of the institutions, Government and religious, are served by a group of individuals, trained in Liberia in the arts of first aid and simple medication, who are called "dressers."

For an over-all picture of these medical installations, but little information was available with respect to their efficiency or location, so that it was necessary to visit them and thus ascertain how they could be fitted into a program of institution-development which would embrace a practical, nation-wide medical-care development program.

After study of the situation, it was felt that the minimum requirements for Liberia would be the establishment of:

A medical center of some 300 beds in Monrovia;
A clinical and pathological laboratory;
A diagnostic center;
An isolation hospital;
Three leprosaria, one in each province;
Three tuberculosis sanitaria, strategically located;
Nineteen secondary hospitals, spread throughout the country;
Sixty out-patient clinics or dispensaries, doing dual service as health training centers.

The sums necessary for realization of such a program would approximate $9,000,000, allowing a cost of $5,000 per bed for

complete hospital construction and equipment. Operating expenses would be upwards of a million dollars a year for salaries alone. Some of the cost of this plant and personnel can be contributed by the religious enterprises, but in every instance outside assistance will be needed.

However, were it possible to bring this program into immediate being, the maintenance expense, calculated at $1,800,000 yearly, would be too great for the Government to bear in the present circumstances. It is therefore necessary that either health progress be geared to industrial progess or that maintenance grants from outside sources be made available to the Liberian Government.

In 1946, the Liberian Government undertook a hospital building plan. It proposes eight hospitals of forty beds each. There is difference of opinion as to whether the sites proposed for these hospitals are the most strategic locations, but they would nevertheless be utilized in the over-all plan of the Foundation.

We early realized that the first need of Liberia was available medical care for its population—some one million people by average estimates—living, except for those in the coastal towns, in villages scattered over 43,000 square miles of mountain and forest. The rapidly expanding system of motor roads will reach more of the villages each year, but for many years, there will be a large proportion which can be reached only on foot or by air.

The aborigines, living in their primitive state, have always depended on the witch doctor with his incantations and charms, but as they come into contact with modern medicine, either through the widening sphere of the religious missions or the Government dressing stations, they show a ready acceptance of it. Indeed, it has been borne out in cross-section disease incidence surveys that, with but very few exceptions, the people are anxious to receive civilized medicine.

With regard to disease incidence, only impressions can be given because only one large survey exists which has been appropriately corroborated by laboratory checking of diagnosis.

This survey was of malaria, conducted in 1948 by Col. Martin D. Young for the United States Department of State, and it revealed a country-wide malaria rate of 30 per cent.

Our impression of disease prevalence, for what it may be worth, is in the order of: malaria, yaws, dysenteric diseases, schistosomiasis, gonorrhea, phagodenic ulcers, sleeping sickness, leprosy, and small pox.

With the exception of small pox vaccination and beginning malaria control, but little preventive measures can be undertaken within the country until medical care becomes available to the populace, and until there is an efficient department of health functioning widely throughout the country.

But meanwhile, disease incidence surveys should be done, and activities such as BCG programs, mass vaccinations, localized mosquito control, specialized treatment stations and maternal and child welfare clinics should be established. The most important step, however, is still available medical care.

The Foundation feels that this can be accomplished over a period of years by coordinating the religious medical institutions with Government institutions, all, it goes without saying, under proper professional medical supervision.

It is visualized that some assistance may come from foundations or organizations such as the World Health Organization or the International Children's Emergency Fund and others. Any type of medical activity results in a growth of institutions adaptable to an over-all program. For this reason it is the plan of the Foundation to stimulate all possible organizations to contribute toward the realisation of the large initial plan.

The problems of preventive medicine, ranging as they do from the simple one of small pox vaccination to that of sleeping sickness control along the borders of the country, are too great to be recounted in detail at the moment. Indeed, the control of anopheles Gambia alone would be so great a problem at the present time that it is beyond the expected income of the country for twenty years even to initiate an effective effort in this direction.

The problems of tse-tse fly control in the sleeping sickness areas also are of great magnitude. Dr. Veatch and others have suggested that the human population is the reservoir of trypanosomiasis, and a control program based on this premise is visualized. Yet, were it possible to sterilize the area with respect to cattle, the food supply of the country would be increased and to some extent the nutritional problems of protein deficiency would be mitigated.

The problems of health education, now being approached in a small way by the United States Public Health Mission, can best be handled through a program based on the development of health centers at the out-patient clinics, plus appropriate instruction within the school system. But, in this primitive civilization, one faces the difficult problem of changing the customs of the people.

The personal hygiene of the aborigines is a large factor in the transferral of diseases among them; for instance bathing in the village pool, eating with their hands from the family pot. It is perhaps possible to change these habits by the utilization of the facilities of industry. It is planned to develop demonstration projects where the employed native shall receive not only schooling for himself and his progeny, medical care and health instruction, but also an opportunity to live in sanitary surroundings and to elevate his social and economic position.

As with any proposals of such magnitude, the prospect of greatly reducing the mortality rates brings up the question: Can the country produce food for an increased population? The United States Economic Mission has calculated that, with the wide use of modern methods, Liberia can export food staples, even while sustaining a greatly increased population.

On the other hand, it is vitally necessary to lower the death and disease rate in order to provide adequate supply of effective labor for the new industries which will develop the country. Indeed, such industries as are already operating within the Republic have noticed an apparent labor shortage.

The Foundation therefore has these problems to face:

To foster a satisfactory system of schools and medical facilities.

To coordinate existing facilities into these programs.

To so interest extra-Liberian groups that means will be forthcoming for the development of these programs.

To persuade industry operating within Liberia that the Foundation principle of social progress is the principle upon which business will operate—and to utilize the facilities of this industry as a vast training program for the development of the citizen of this rapidly developing Republic.

UTILIZATION OF HUMAN RESOURCES THROUGH INDUSTRIALIZATION[1]

WILBERT E. MOORE

THE industrial system is rampant in the modern world. Its effects spread to the most isolated regions in some form or degree. Its system of communications and organization of world markets, and the political power that its productive system makes possible, have produced an interdependence of all peoples everywhere. The process is by no means complete, nor is its final fruition in any particular form determinate and inevitable. Even the results so far effected are not entirely clear or their implications commonly understood. Yet one elementary fact stands out: the isolated primitive or peasant community has everywhere lost part of its insularity. The true primitive represents a small and diminishing species. The self-sufficient peasant is shaken by forces beyond his control and perhaps even further beyond his understanding.

The impact of the industrial system on primitive and archaic cultures is a crude empirical phenomenon. It makes irrelevant or academic much of the well-meaning debate about interfering in other cultures. The question in most areas of the world is not whether change under external influence ought to be allowed, but rather the form and degree of change, the interests taken into account, and the human as well as material costs of transition.

Ironically, the arguments in behalf of sealing off the effects of new productive organizations and processes, in order to preserve as much as possible of traditional values in the far places of the world, arrive approximately at the same policy as that

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of the most cynical "exploiter," who seeks to use native labor but to keep native societies otherwise outside the industrial system. If the effective utilization of human resources for the achievement of health, longevity, and heightened levels of material well-being be the goal, then education strictly "adapted" to *native* needs, wage labor as purely supplementary to primitive modes of production, and public health measures that do not change fertility patterns represent serious compromises in the short run and mixtures of doubtful stability in the long run.

In the present paper some general comments about the nature of the industrialization process are followed by a discussion of labor mobility as a particular aspect of this process, with some field research evidence on a few points.

The Case for Industrialization

The most general case for industrialization rests upon the range of goods and services made available for human consumption. As a productive system, it tends to free both supply and demand from traditional restraint, and to entail a dynamic rather than a static relation between man and nature.[2]

The particular case for industrialization of primary relevance here rests upon enhanced opportunities, through specialization, for utilizing special qualities and aptitudes of producers. Human beings both constitute necessary means and determine the ends of productive efforts. As means, or, following the title of this session of the Conference, as resources, human beings may be considered as coming within the general case for optimum utilization. The duality of the human role in this scheme com-

[2] This abbreviated and therefore dogmatic formulation rests upon the abstract characteristics of the industrial mode of production and neglects many concrete problems and variations in experience. For example, differences in systems of control of production and allocation of products, and the problems of "balanced economies" as opposed to regional specialization are not irrelevant in the concrete instance but cannot be explored here. It may be maintained, however, that given certain characteristics of the industrial system—for example, utilization of advanced technology and of specialization of labor—other characteristics are inherent and in considerable measure independent of particular goals and procedures—for example, a reasonably elaborate system of exchange and of effective incentives to insure labor mobility and the development of skills. It follows that the case here does not assume or depend upon the institutional structure of liberal capitalism.

plicates the issue, however. Inherent in the nature of human society are limitations to efficiency in the utilization of human resources for production, for in no society can production be the sole social function and in no human being can it be the sole motive. Within those limits, industrialism is that system of production which most effectively uses differences in aptitude and interest.[3]

Labor as a Factor in Industrial Development

Usual Approaches to Industrialization Theory. Industrialization may be viewed with partial accuracy as a process involving an increasing range of resources exploited, an increasing amount and type of goods produced, and an increasing efficiency of capital and technique employed. From this point of view the process may be studied as a dynamic relationship among certain elements or "factors," which in their combination presumably determine both the pattern and rate of economic development.

To the extent that social scientists have investigated basic economic transformation as distinct from economic relations within fairly established institutional conditions, attention has been turned primarily to questions of capitalization, organization or enterprise, resources, and markets.[4] It may be fairly said that none of these is irrelevant to the analysis of industrialization, but that even in combination they do not comprise an adequate set of directives for research. The demographer will urge the importance of population, the political scientist

[3] Again, this formulation is abstracted from a host of concrete issues and problems: for example, the extent to which various categories of human laborers as means (or, in some economic formulations as "costs") of production share in determining the ends of production; the "dilution" of skill that accompanies some forms of specialization and the attendant problems of motivation; the multitudinous human problems of mobility and its accompanying uncertainty.

[4] *See,* for example, Clark, Colin: The Conditions of Economic Progress. London, Macmillan and Co., 1940; League of Nations, Economic, Financial and Transit Department: Industrialization and Foreign Trade. Geneva, 1945; Mandelbaum, K.: The Industrialisation of Backward Areas. Institute of Statistics, Monograph No. 2, Oxford, Basil Blackwell, 1945; Sombart, Werner: Capitalism, *in* Encyclopaedia of the Social Sciences, 3: 195–208; Weber, Max: The Protestant Ethic and the Spirit of Capitalism, *trans. by* Talcott Parsons. London, George Allen and Unwin, 1930.

will call attention to the direct and indirect effects of governmental forms and policies, the sociologist will insist on the relevance of variable social structures, and economists of various persuasions will press for the inclusion of transportation, technology, and financial organization.

It is neither possible nor necessary here to attempt a complete analytical framework for the study of industrialization. It is, however, possibly useful to suggest a rough classification of factors necessarily included in such a framework, and then proceed to a particular and particularly neglected element in the process.

With some modification and amendment, the recent work of Chang on the theory of industrialization[5] may serve as a guide to the factors strategic to the study of the industrialization process. These may be classified as (1) generating factors—entrepreneurship, technology, and capital accumulation; (2) conditional factors—resources, population, and social institutions; and (3) connecting factors—transportation and markets.

It should be noted that the classification, and even the terminology, is in some degree arbitrary. "Population" and "social institutions," for example, are in combination capable of interpretations in terms sufficiently broad to include both generating and connecting factors. A more important consideration, however, is the dynamic interdependence of these variables, and particularly of those labelled "conditional." If in the beginning of the process of industrialization they may be regarded as conditions, they are not static. Resources are always relative to the prevailing state of the useful arts. Population in its size, composition, and distribution enters the economic system both as the source of labor supply and the consumer of products; it is moreover subject to changes touched off by economic transition that may either foster or impede

[5] Chang, Pei-kang: AGRICULTURE AND INDUSTRIALIZATION. Cambridge, Harvard University Press, 1949, especially pp. 77–90. The "factors" suggested here differ from Chang's treatment principally by addition. Chang does not deal with capital accumulation, transportation, and markets, and he treats "social institutions" as given.

further changes toward industrialization. Social institutions similarly may be viewed as both barriers to and sources of change. In the study of complex phenomena, simplification is both necessary and hazardous.

It is with the role of social institutions and their attitudinal counterparts that the present discussion is primarily concerned, not only because the focus is on "the utilization of human resources,"but also because the institutional and organizational features of societies have been more often assumed as "given" than they have been directly studied by students of the industrialization process. And among the institutional conditions necessary for successful industrialization—for example, particular forms of control of property, conditions of specialization, organization of exchange, and solutions to the problem of political order—it may be appropriate to emphasize the importance of *mobility* of the factors of production and especially of labor.

Even with regard to the geographical location of industry, it is rare that raw materials, sources of power, and available labor are in handy juxtaposition. Moreover, capital must be transferable out of agriculture, commerce, and traditional handicrafts into manufacturing and related activities, and workers must be moved to new places of employment and, more importantly, to new types of employment. If this latter movement is the central feature of "utilization of human resources through industrialization," it is also a major source of difficulty in the process.

Labor Mobility in Theory and Fact. In the studies and theories of economic development, the problems of labor supply have been largely neglected. This neglect has arisen in part from an exclusively quantitative, demographic approach to manpower or "labor force," in part from a naive view of economic motivation.

It is evident that a supply of labor judged to be numerically adequate for industrial expansion on the basis of apparent unemployment and underemployment in agriculture will not an-

swer the problem of labor supply unless that labor is in the right place, possesses appropriate skills, and can be induced to enter new places and types of employment.

The question of "economic motivation" is central to the appraisal of labor mobility. This question has not often been raised with reference to the transition from non-industrial to industrial employments, even with regard to the older industrial economies. Economic theorists and their sociological critics have alike concentrated on the motivation of the capitalist or industrial enterpriser. Wage theory in economics has been more concerned with the demand-price of labor—that is, labor as a cost of production—than with the supply-price of labor—that is, the determinants of the worker's willingness to offer his services.[6] Yet to the extent that the willingness of primitive or peasant to enter industrial employment cannot simply be taken for granted, it is of theoretical and practical importance to examine the question.

There has been some recent interest in this occupational shift, emphasizing the theoretical importance of wage differentials in effecting the transfer. The ability of industry to outbid the agricultural sector of the economy for labors then rests upon the greater productivity of industrial labor (made possible by higher capitalization and efficiencies of scale and organization, and related to the greater elasticity of demand for manufactured products) and subsequently also upon the displacement of farm workers through mechanization.[7] Wage differentials, expressed in the labor market, thus become the effective device for securing geographical mobility, movements within the same general sphere of production and level of skill, and the acquisi-

[6] *See* Moore, Wilbert E.: Theoretical Aspects of Industrialization, *Social Research*, 15: 277–303, September, 1948; reprinted as an Occasional Paper of the Institute of World Affairs.

[7] *See* especially Chang, *op. cit.*, pp. 51–57, 176–194; Ahearn, Daniel J., Jr.: THE WAGES OF FARM AND FACTORY LABORERS, 1914–1944. New York, Columbia University Press, 1945, Chap. VIII, Wages, Production, and Productivity; Schultz, Theodore W.: AGRICULTURE IN AN UNSTABLE ECONOMY. Committee for Economic Development Research Study. New York, McGraw-Hill Book Co., 1945, Chap. IV: Distribution of the Labor Force and Earnings, and Chap. IX: Underemployment and the Attendant Low Earnings in Agriculture.

tion of new and higher skills required by the industrial system of division of labor.[8]

The efficacy of wage differentials rests upon clear if often implicit institutional and motivational assumptions. Those assumptions may be briefly stated as a flexible competitive system at least with regard to occupational placement, made effective by a mobile, financially acquisitive orientation of the worker.[9] It is the absence of these conditions that characterizes non-industrial societies, and gives rise to questions of the relevance of their general and particular structural features as they relate to the possibilities of industrial development.

On the basis of a fairly detailed review of available evidence on labor recruitment and utilization for modern forms of economic activity in newly developing areas, the critical importance of institutional and attitudinal variables can be maintained.[10] The nature of that evidence may be summarized here by a bare and consciously alliterative classification of relevant factors: the bane of barriers, the prevalence of pressures, and peculiarities of positive incentives.

Perhaps the most impressive, if scarcely surprising, set of social factors that impinge on economic development are those that constitute barriers to innovation. Among these are: igno-

[8] With regard to the acquisition of skills, even the pure theory of wages requires a recognition of frictions and time-lags occasioned by the necessity of training. For a fuller discussion of these problems, including the "theory of correct occupational distribution," *see* Moore, Wilbert E.: INDUSTRIAL RELATIONS AND THE SOCIAL ORDER. New York, The Macmillan Co., 1946, Chap. XI: The Sources of Labor Supply.

[9] It should be emphasized that these assumptions are not stated as the requirements for an industrial system of division of labor, but only of the requirements for the validity of the theory of wages as *the* effective incentive to mobility. However, the claim on empirical grounds that wages do not constitute an adequate incentive for the recruitment of industrial workers in non-industrial societies would not destroy the validity of the requirements of wages and occupational competition as features of the *industrial* system. Indeed, it may be asserted that competitive occupational placement is essential to a full development of individual capacities and skills in production (whatever the competitive incentives may be) and that wages or some equivalent means of exchange and distribution are an essential counterpart of specialization of productive activities. In turn, neither of these propositions has any necessary implication for the effect of wage *differentials*.

[10] An abbreviated summary of the comparative materials on industrial labor recruitment has been published. *See* Moore, Wilbert E.: Primitives and Peasants in Industry, *Social Research*, 15: 44–81, March, 1948; reprinted as an Occasional Paper of the Institute of World Affairs. A fully documented review will comprise a major portion of the final report on the research project.

rance, whether of the existence of alternatives or of the skills and techniques to make them effective; the loss of security, usually assured in non-industrial societies through established relationships to means of production (especially land) and established patterns of social obligations (especially through kinship structures); dislike of industrial disciplines, particularly those of time and impersonal authority; and preference for customary standards, including bases of prestige and esteem, and for customary types and levels of consumption. The existence of customary as distinct from expanding standards and aspirations is a remarkably common problem in early stages of industrial development, whether in twentieth century Java or eighteenth century England. It gives rise to absenteeism, turnover, and complaints that the workers are irrational. Similarly, nepotism and other particularistic intrusions (including ethnic distinctions upheld by enterprisers themselves) constitute a pervasive problem in the expansion of Western economic patterns.

Accumulated experience indicates that at the start of the industrialization process workers are, in terms of crude physical analogy, more often pushed than pulled into factory or other wage labor. This is again scarcely surprising in view of the prevalent social barriers to mobility. Among the more common and effective pressures several may be indicated: land shortage and the coercion of hunger, which may be accentuated by particular consequences of the outside impact, such as partial dispossession of native populations, mortality control without fertility limitation, displacement of handicraft products by cheap manufactured goods; direct and indirect manpower allocation by superior power, including direct coercion through various devices ranging from slavery to "industrial draft," and indirect coercion through taxation payable only by wage-earned money. Hunger and force constitute effective stimuli to new activities, but only so long as the hunger or the coercive sanctions last, and only for unskilled, gang labor. Whether the devices used to accomplish the initial change may be withdrawn

in favor of more positive incentives, on the principle of the "entering wedge," clearly depends on the whole functional complex of factors surrounding the change.

Even positive incentives, whether or not mediated through wages, have many peculiarities as they are applied in predominantly non-industrial economies. Wages, for example, are functionally dependent upon markets where goods and services are available. Those goods and services are themselves likely to be most effective as incentives if they readily fit traditional patterns of consumption. Moreover, the new opportunities are likely to be sought most eagerly by disaffected and dissident elements in the pre-industrial setting. On the other hand, the idea of free and universal mobility by merit is exceptional and seems to have something of an explosive quality as it penetrates traditional social structures.

It is for this reason that an attempt was made to increase the be stated as predictive principles "other things being equal," but that in the concrete case other things are notably unequal and that a more empirically relevant analysis must take into account the interdependence of analytically separable factors.

It is for this reason that an attempt was made to increase the precision with which the intersecting variables could be analyzed, through a direct field investigation specifically oriented to hypotheses on labor mobility in newly developing areas.

Some Results in Mexico

Because the reports on the recruitment of labor for modern economic enterprise are replete with explanations after the event and notably lacking in quasi-experimental controls regarding allegedly important factors, it was considered appropriate to undertake one direct field investigation in an attempt to clarify detailed relationships. On the other hand, it is clear that the results of any local field study beg many questions relating to major cultural and organizational differences, which can only be approached on the basis of comparative analysis.

Mexico was selected as the general area for the field study

for several reasons: (1) political independence and active governmental programs looking to industrial development; (2) the co-existence of modern manufacturing plants and tribal villages, with a "culture," whether Spanish or Indian, substantially different from that of the older industrial countries; (3) the practical considerations of proximity and availability of trained field workers native to the country and familar with local conditions.[11]

The investigation was made in the "Zone" of Atlixco in the State of Puebla, where modern textile plants and Indian villages are in close proximity (Fig. 1.). The "Zone" includes the market and small-manufacturing city of Atlixco itself, a city of 17,000 population and the seat of a municipio of 34,000, and thirty surrounding municipios with a population of over 189,-000. Outside of the immediate area of Atlixco, the region is a predominantly agricultural and trading area, with only five other population centers over 4,000 in population.[12]

The data of the investigation consist of:

(1) Completed schedules based on interviews with adults in two villages, the villages themselves selected in order to provide quasi-experimental controls on the basis of uniformities and

[11] The field investigation was carried out by the Museo Nacional de Antropología under the general supervision of its Director, Dr. Daniel F. Rubín de la Borbolla. Sr. Ricardo Pozas Atciniega was primarily responsible for the actual work in the villages and factories; he was assisted for a short time by Sr. Juan de Díos Rosales.

Arrangements for the study were made through personal conferences and correspondence. The local area selected for study was determined after preliminary investigation in three possible areas, which in turn were chosen as meeting the general requirement that "Indian" villages should be located within the potential labor market area of one or more factories. Interview schedules and instructions were prepared by the writer, translated and modified by the Mexican researchers in view of their knowledge of local idiom and problems of investigation, and further modified on the basis of pre-testing incident to the final selection of the area for the study.

We believe that the selection of a "native" area for study in strict accordance with the theoretical problem being investigated, and the conduct of the investigation centering around a uniform interview schedule supplemented by the more common descriptions of social organization are rare but appropriate procedures.

[12] The five are, in order of size, Cholula de Rivadabia, 8,400, famous for its numerous churches built on the sites of destroyed Aztec temples; San Martín Texmelucan, 7,600; Izúcar de Matamoros, 7,000; Huejotzingo, 4,900; Metepec, 4,300, a factory town in the municipio of Atlixco and the locale of part of the field investigation. Population figures are based on the Mexican Census of 1940. See Estados Unidos Mexicanos, 6º Censo de Población, 1940, Puebla. México, D.F., Secretaría de la Economía Nacional, Dirección General de Estadística, 1947.

Fig. 1. "Zone" of Atlixco, with location of important population centers and the villages of San Baltasar Atlimeyaya and San Juan Huiluco.

differences. These schedules represent interviews with 365 persons in San Baltasar Atlimeyaya (Municipio of Tianguismanalco), which had a population of about 1,200 in 1940, and 227 persons in San Juan Huiluco (Municipio of Huaquechula), which had a population of around 600 at the last census.

(2) Completed schedules based on interviews with 500 workers in the large textile factory at Metepec (Municipio of Atlixco) and 100 workers in the small factory of La Concepción in the city of Atlixco.

(3) Descriptive data incident and supplementary to the systematic interviews, including the historical and ecological setting of the region and characteristics of social organization in the villages and the factories.

(4) Data derived from the 1940 Census, which provides a variety of results by local areas and allows comparisons within the "Zone" and of the area investigated with the rest of the country.

Space does not permit detailed description of data collected, procedures of analysis, or presentation of more than a very few of the results. With regard to the region as a whole, its "mixed" social character may be seen from a few comparisons with all of Mexico. There is in the "Zone" of Atlixco a higher proportion of the gainfully occupied population (excluding unpaid family workers) engaged in "industry" than in Mexico as a whole—13 per cent as compared with 11. On the other hand, the proportion of population over 6 years of age that is illiterate is higher in the local region than the national average—61 per cent and 55 per cent respectively—and by a combined index of Indian cultural characteristics the area is decidedly more "backward" than the national average.[13]

The two villages studied intensively provide some interesting comparisons. They have common cultural traditions (essentially Aztec), a common Indian language (Nahuatl or Mexicano), and common dependence on agriculture and related activities, partly self-sufficient, partly oriented to the sale and barter market in Atlixco. Each has benefited from the *ejido* (land reform), although unequally, and they are about the same distance from Atlixco (approximately 15 kilometers) and served by a bus line that goes directly to the village on the two market days each week.

[13] Data on industrial employment and literacy are derived from the RESUMEN GENERAL and PUEBLA volumes of the 1940 Mexican Census, previously cited. The index referred to cannot be explained here, except to note that it is based on language (Indian exclusively, bilingualism, Spanish exclusively) and various degrees of adaptation to European-style clothing, cross-classified. The basic data are derived from the 1940 Census. The same data are used in a somewhat different way in an especially valuable book by Whetten, Nathan L.: RURAL MEXICO. Chicago, University of Chicago Press, 1948, pp. 360–369.

The contrasts are, however, also significant. San Baltasar Atlimeyaya is located on the lower slopes of the famous volcano Popocatapetl, and is reached by a narrow, rough, and mountainous road. San Juan Huiluco on the other hand lies scarcely a kilometer from the Pan-American highway, over which there is frequent bus service from the south to Atlixco. Not only is it thus more closely linked to the city, but it lies in close juxtaposition to the Puebla State Agricultural School at Champusco, which occupies the central portion of the old *hacienda* of that name, in the breaking up of which San Juan Huiluco was a major beneficiary in *ejidal* lands.

The soils of the mountain village are poor, although adequately watered by irrigation. The soils of the village in the lowlands are good, and sub-tropical climate permits a wider variety of products. Agricultural specialization and market orientation are evident. Although detailed census data are not available for the two villages, data for the municipios of which each is a part and of which each may be regarded as representative indicates that land ownership by males gainfully occupied in agriculture is higher in the mountainous area than on the plain. By contrast, 48 per cent of those interviewed in Huiluco were members of the *ejido*, whereas only 21 per cent were beneficiaries of the land reform in San Baltasar.

Literacy in the two villages does not differ markedly, either as shown by the census for their respective municipios (where illiteracy is indicated as approximately 70 per cent) or as shown by the direct field investigation (about 60 per cent of those adults without work experience outside their villages). Both villages have public schools and local units of the *sindicato* (union of farmers and beneficiaries of the land reform). On the other hand, the municipio in which San Baltasar is located is remarkably more "Indian" in character than the municipio including San Juan.[14] This is confirmed by the results of the direct interviews, which showed that Nahuatl was the mother

[14] The respective index values (on the basis of 5.0 indicating complete Indianness) are 3.6 and 2.2. See preceding note.

tongue of 96 per cent of those interviewed in Baltasar, whereas Spanish was the primary tongue of 51 per cent of those interviewed in San Juan.

By all these tests and a number of others, San Juan Huiluco, the village in the lowlands near the highway, is somewhere midway between the "folk" culture of San Baltasar Atlimeyaya and the "urban" culture of Atlixco, or, better, Puebla or Mexico City.[15] The small predictive value of such unilinear progressions is shown up sharply in the present investigation. It is from the folk community, the relatively isolated and seemingly homogeneous village, that men go out to seek work, many of them continuing to live in the village but not forming part of it along traditional lines. Their lives are bound up with the factory and its affairs at least as much as with the local village. And, contrary to expectation on the basis of experience in other transitional areas of the world, they generally regard the change as permanent, whether desirable or not.

Of the adult males who live in San Baltasar, some 17 per cent work outside the village, and of these 86 per cent are engaged in factory work. In San Juan, only 3 per cent work outside the village, and none is engaged in factory employment.

By inference from the divergent characteristics of the villages, it is the pressure of poverty and not the degree of approximation to urban ways of life in general that accounts for the marked difference in results.

This inference is given direct confirmation by the fact that well over half of the replies to an "open-ended" question on reasons for seeking factory work emphasized "necessity" in comparison to a little over a third that indicated a preference for factory labor.

Although in a more detailed report it will be possible to show many relationships for which space is not available here, one somewhat oversimplified conclusion may be emphasized: within the traditional order of non-industrial societies the barriers

[15] *See* Redfield, Robert: THE FOLK CULTURE OF YUCATAN. Chicago, University of Chicago Press, 1941, especially his concluding chapter (XII), The Folk Culture and Civilization.

of labor mobility are so substantial that acute sensitivity to minor differences in financial advantage should not be expected. Industrial wages are likely to be "high" only in relation to serious poverty, as the new worker is typically unskilled and cheap labor gives a competitive advantage to enterprises in newly developing areas. At least in the shorter or longer transitional period, the shortage of land and the loss of markets for handicraft products are likely to be as important in motivating the search for new opportunities as are more positive incentives. Education may facilitate the transition and is of crucial importance in completing the process through providing both the aspirations and the technical means for mobility.[16] Hunger and dissolution of ancient ways are also effective sources of change.

One final and tentative comment may be made. Although the proposition so far defies exact proof or disproof on the basis of available data, all indirect evidence is consistent with the view that the Mexican land reform (the *ejido*) was a "conservative" step in its relation to further economic modernization. The visitor without a sense of Mexican history is likely to be impressed with the stability of the Indian communities, many of which appear to be little changed since the pre-Columbian era. However, the fact is that many of the "primitive" patterns of life were re-established as recently as 15 years ago, and many more since the Mexican Revolution of 1917–1920. It appears at least plausible that the land reforms have, aside from their aims regarding the incorporation of the Indian into the national life, succeeded in accentuating agricultural underemployment and the isolation of the native village from the forces of modern life, good or bad.

Although Mexico is not commonly considered to be overcrowded, it does have substantial unused human resources. If

[16] In this regard, in San Baltasar a significantly higher proportion of those with outside work experience were literate than those who had always worked within the village (67 per cent as compared with 40 per cent). Unfortunately, however, the question concerning where the individual had learned to read and write was inadequately worded to distinguish between those who had learned to read in primary school as children and those who had learned to read "in school' as adult factory employees under the adult literacy campaign. Education may have been the result as well as the cause of mobility.

further industrialization is an effective way of utilizing those resources toward improved standards of health and material welfare, pressures as well as incentives would seem to be necessary to effect the transition, and measures designed to alleviate pressures without changing traditional patterns (or even recreating them) are likely to represent a short-sighted policy.

UTILIZATION OF HUMAN RESOURCES IN AGRICULTURE

CONRAD TAEUBER[1]

EVERY discussion of the relations of population and resources or of population and food necessarily starts with certain assumptions. It is proposed here to start with the assumption that the world possesses the necessary resources and that mankind possesses the necessary scientific and technical knowledge to provide adequate food for the people who now inhabit the globe. It is assumed further that this will continue to be true for the foreseeable future.

That is not the same thing as saying that mankind *will* provide itself with the food necessary for health and well being. To make that statement it would be necessary to postulate that mankind will develop the social forms that are necessary to bring about the application of existing and still to be developed science and technology, and to provide for an equitable distribution of the fruits of such activity to the people of the world. This would require some major social adjustments, possibly including some large-scale redistribution of the world's population according to the distribution of available resources.

This basic assumption might of course be debated at length. At the present time, as often in the past, many voices can be heard proclaiming that the end of the process of increasing the world's food supplies is in sight. They point out that past improvements in nutritional levels in large parts of the world have been secured chiefly through destructive use of the basic food producing resources and that this is a process which cannot continue indefinitely. They claim that through increasing control of mortality man has now assured himself the means of self-destruction, for the increases in population which are made possible as control over mortality is extended are of such an order that food production cannot possibly keep up with popu-

[1] Head, Statistics Branch, Food and Agriculture Organization of the United Nations.

lation growth. They argue that the experience of Europe which markedly increased its levels of living during the three hundred years while its population increased six-fold is not relevant to the situation in those areas in which birth rates have not been adjusted to the lower levels of mortality. There no longer are large new territories capable of absorbing the population which the expanding economy on the old continent could not absorb. Moreover, the population masses involved are so large that the increases in food production which are required to maintain present consumption levels are extremely large. For example, India's population in the middle of the twentieth century is more than twice as large as that of Europe in the middle of the eighteenth. That of China is more than three times as great. During the first half of the twentieth century Asia's population increased by nearly 7 million per year.

Broadly speaking, world food supplies have generally kept up with the increases in the world's population. There have been local droughts and famines, and there continue to be areas in which malnutrition is the rule. But in the main it is hardly to be gainsaid that the world today is producing more food and on the average is feeding the people more adequately than it did one or two centuries ago. Total world food production is currently at levels higher than those ever reached before. Though nutrition is inadequate in large areas of the world, a greater proportion have adequate food as a normal situation than was the case in the earlier period; great famines are less frequent and less widespread, and the fearful epidemics are less frequent and less widespread. There have been substantial increases in the expectation of life, a fact which is not unrelated to nutritional levels.

These statements are only partially subject to statistical demonstration, for where the requisite statistics do exist, they are a relatively modern phenomenon. For the western world some statistics can be adduced to buttress such statements and additional substantiation is to be had from scattered studies such as those assembled by Parmalee Prentice. There is little

reason to believe that this generalization is not true also for most of the other parts of the world, even those where agricultural methods have changed little during the period of recorded history.

Long-term statistical series on food production are not available. One statistic may, however, be cited as a case in point. World wheat production is estimated at 65 million metric tons per year in the period 1883–1890; in the sixty years since then it has more than doubled. The world's population increased less rapidly than that during these sixty years, and the rate of growth was still smaller for that portion of the world's people for whom wheat is a staple element in the diet.

Developments in recent years, reflecting the effects of the war, however, give grounds for very real concern for the future. Here the statistics are more adequate than for the longer time periods. For this period one main conclusion is inescapable: In countries in which the food and nutrition situation was generally satisfactory before the war it has been maintained and even improved; but in countries where people historically have had too little food, the situation has grown worse. And these countries of lowered food consumption include more than half the world's population. Some countries have not yet fully recovered from the effects of the war on their agriculture, and recovery in most countries appears to be slow.

Recently FAO assembled statements from governments indicating their plans or projections for agricultural production in 1950–1951. These plans and projections indicate that if governments and farmers are successful in their programs and if the assumptions as to weather are fulfilled, the volume of food production would be about 8 per cent higher than before the war,[2] double the increase in total agricultural production which has already occurred since the war. Since population in 1950 is expected to be 13 per cent above that for 1937, food supplies per person in 1950–1951 would be lower than before the war if only these plans and projections are achieved. The index of

[2] Excluding U.S.S.R.

production of food commodities per person, taking 1934–1938 as 100, is computed at 93 in 1948–1949. It would rise to only 95 by 1950–1951.

These figures are heavily influenced by the high levels of production in the United States and Canada. In the Far East, Europe, Latin America, and even in Oceania, production per person would be about 10 per cent lower than pre-war. If the rate of progress indicated by the 1950–1951 targets is projected into succeeding years, pre-war levels of production per person would not again be reached before 1953 in Europe and 1960 in the Far East and Latin America. Only in the United States and Canada is production per person in 1949 well above pre-war. In the United States a deliberate reduction in the total volume of agricultural production during the next two years is expected, with the result that whereas the index of food production per person in the United States and Canada in 1948–1949 stands at 123, in 1950–1951 it will have dropped to 115. This planned reduction applies particularly to grains.

In short, agricultural production is expanding at such a slow rate that the restoration of pre-war levels of supplies per person has not yet been achieved and is not likely to be achieved within the next two or three years, unless governments and farm people will move ahead more effectively and more rapidly than seems probable at the present time. Nor can restoration of pre-war levels be taken as a desirable goal. It represents simply a convenient statistical bench mark. As has been frequently pointed out, the pre-war levels of food consumption in many parts of the world are far from adequate.

These plans and projections are not predictions. The indicated outcome is, of course, not inevitable. The need for increasing production of agricultural commodities may lead to effective programs for more rapid increases. Similarly the results would be different if there should be effective programs for moving the commodities which appear to be in surplus in some areas to areas in need of such products, and the present fears of surpluses would thereby be dissipated.

A dramatic illustration of what is possible, even under conditions which in some respects are quite adverse, is supplied by the experience in the United States during the war. Total agricultural production in the later war years in the United States was about one-third greater than before the war, though approximately one-seventh less manpower was used. But fertilizer use was nearly doubled, more farmers used insecticides and machinery, and the use of some of the large machines was spread over larger areas and longer periods of time than before. The use of hybrid seed corn became virtually universal in the corn growing areas. Improvement in varieties of crops and livestock went on rapidly. There were also improvements in the methods of storage and in the efficiency of transportation. Unusually favorable weather contributed a great deal, and so did the fact that the United States entered the war period with large stocks of wheat and feed grains. But the new levels of production are not an accident. They represent rather new levels from which further increases are to be expected.

The effects of the rapid spread of hybrid corn provide one of the many dramatic stories in this situation. In 1949 farmers harvested 43 per cent more corn than the pre-war average on 7 per cent less land; yields had increased by approximately 60 per cent. Much of this increase in yield must be credited to the widespread use of hybrid corn.

In the case of wheat, large increases in productivity of labor are reflected in decreasing amounts of human labor required for its production. It is estimated that in 1820, 320 man hours were required to produce 100 bushels of wheat. By 1900 this had been reduced to 108 hours and in 1949 was only 34 hours.

Obviously such improvements in yields are part of a continuing process. A special study conducted by the Department of Agriculture, in cooperation with the Land Grant Colleges in 1944, found that under assumed conditions of employment, income, and demand, as well as under known levels of farm technology, it would be feasible to increase farm output about 43 per cent above 1935–1939, or 12 per cent above the 1945 level.

Increases in agricultural production obviously are not limited to the United States. Grain yields in Europe remained at ten bushels or less per acre from the fall of Rome until the French Revolution. With the spread of new practices and rotations late in the 18th Century, they were nearly doubled. In Germany wheat yields rose from ten bushels per acre just before 1800 to sixteen bushels by 1850. In France they went to fourteen bushels per acre and in England to something over twenty bushels by 1850. By 1934–1938 they had gone to about thirty-five bushels per acre in Germany and the United Kingdom, and to about twenty-three in France.

For the world as a whole the development and application of agricultural science is relatively young. Two hundred years ago a grain harvest that yielded four or five times the amount of seed sown was considered satisfactory, and in some parts of the world even today that is accepted as a norm. In some areas, however, a grain harvest returns fifteen to twenty times the amount of seed sown. Cows which produce 200 or 300 gallons of milk in a year were commonplace 200 years ago, and are still considered acceptable in many parts of the world. However, in some areas yields of 2,000 gallons per cow in a year are commonplace, and record yields go considerably above that level.

It would be tempting to discuss the possibilities of future developments in science and technology as they apply to food production, to speculate on the possibilities of new developments in the growing of algae, or of some of the other methods that may be developed for the more effective conversion of solar energy into food energy. Some of these developments may be reality before present techniques are fully applied and exploited. But it is not necessary to resort to such speculation; it is quite adequate to attempt to visualize what might be accomplished if improved methods already tested and in use by the more efficient agricultural operators became generally accepted in the several countries. Estimates on this basis are then estimates of physical potentialities and indicate what

could be done with present knowledge if institutional arrangements were made for effective use of soil and other agricultural resources on a sustained basis.

Salter[3] has prepared such an estimate and related it to the food requirements of the world in 1960, as estimated by FAO. These estimates are based on regional standards of nutritional adequacy as established by a group of nutrition experts and related to the estimated world population in 1960.

Using this yardstick he comes to the conclusion that from present crop land it is possible to produce virtually all of the cereals needed by 1960, more than the total volume of roots and tubers needed, and also more than the total volume of sugar required. However, the volume of fats and oils would still be short by 10 per cent, pulses and nuts by about one-third, meat by about one-fourth, milk by about two-fifths, whereas the total volume of fruit and vegetable production will be only approximately one-half of the estimated requirements.

He estimates further that it is feasible to bring into production some one billion acres of land in the tropical areas, and some 300 million acres of land outside the tropics. The assumed production level per crop acre in the tropics is equivalent to that already achieved in the Philippines, for the non-tropical soils the equivalent of that already reached in Finland. Adding the assumed production under these conditions to that considered attainable from present crop land would more than adequately provide all of the required foodstuffs, and for cereals, roots and tubers, sugar and fats and oils, the total "attainable" under these conditions would be more than double the goals used in these computations.

Two-thirds of the world's population are engaged in agriculture, and a large proportion of these live in countries where average food supplies pre-war were below the level of adequacy. If the resources are available, why then do large sections of the world's population receive so little return for their efforts to

[3] Salter, Robert M.: World Soil and Fertilizer Resources in Relation to Food Needs, Freedom from Want. *Chronica Britanica*, Summer, 1948, II, No. 4, pp. 227–235.

produce food and other agricultural products? Many answers could be given but no one answer would be adequate. The process and techniques for agricultural development are the process and techniques for general economic development. Agricultural development in any large area or region must be a part of total economic development, and increases in the productivity of agricultural workers are limited unless there are corresponding increases in the productivity of non-agricultural workers.

Much has been written in recent years on the wasteful ways in which land, water, and forest resources have been used and the need for conservation of these resources. From the shocking record some have drawn conclusions for action which are directed at conservation of the basic resources to the neglect of other elements in any pattern of resources use. In setting goals for action, four different objectives are inseparable: (1) Increased production, which the people of the world desperately need; (2) Keeping the soil at a high level of productivity; (3) Fair incomes to land users for their labor and for the use of their capital, and (4) Full use of the labor and genius of rural people. These four objectives are closely interrelated. No one of them can be reached while others lag behind, and no program is likely to be effective which seeks to carry any one of them forward without regard to the others. The goal of conservation of the soil and of other agricultural resources is one of finding the most economical uses and practices which will give sustained production and then to apply them to each unit of operation.

The more effective utilization of human resources in agriculture requires industrial development, more efficient use of land and other resources now being used in agriculture, and finding and developing new and additional land for agricultural development.

In a broad sense one of the very real barriers is the pressure of population on agricultural resources. With few exceptions, the areas in which the proportion of the population engaged

in agriculture is high are areas in which incomes are low, nutrition levels are low, and there are significant cultural and economic barriers to agricultural expansion or improvement. In the main, these are areas of high fertility, and as preventable mortality increasingly comes under control, they are potentially areas of high rates of population increase. Educational and social services are inadequately developed. Low income levels make it difficult to accumulate the capital required to increase agricultural resources or to shift to more efficient methods of agriculture which require a greater use of capital. The same elements operate to restrict the development of industrial and other non-agricultural activities.

With the growing pressure of population on land resources, there is continuing discouragement to the introduction of more efficient methods of cultivation, for labor tends to become cheap in relation to other elements of production. There frequently is a growing degree of parcellization of land holdings, thus reducing further the degree to which more efficient methods could be employed. The competition for land becomes so intense that it fosters concentration of land holdings and exploitive forms of land tenure. Such societies are also resistant to changes in methods and tend to cling to traditions and inherited values. They lack the aggressive search for the more efficient and the new which characterizes the societies ordinarily designated as progressive. The pressure of subsistence and the low value placed on human labor and on human comforts also contribute to the maintenance of established patterns of activity, the results of which can be anticipated from experience, even though an outsider could demonstrate with relative ease that certain modifications would provide more returns with less effort.

There are wide variations in the extent to which soil and other resources are now available, from country to country, and within countries. If agricultural production is measured in terms of the eight major crops which supply more than 85 per cent of the world's food intake and this production is related

to the number of persons included in the agricultural population, the large variations in productivity are clearly revealed. At the one extreme is North and Central America, for which the average production per person is six times that of the average for the world. Oceania is not far behind. For Europe the figure is only approximately double the world average, whereas in Asia it drops to one-half and in Africa it drops to one-third. The average for South America is slightly above that for the world as a whole. There are, of course, similarly, large variations by countries, and within the countries whose averages are high there will be wide variations as among the more efficient and the less efficient farmers. Instances of land being withheld from uses which would contribute most to the nutrition of the people are easily found in any country.

In part the problem is a political one. Intra and inter-national migration of population from one agricultural area to another, both to provide additional labor and for settlement of areas to be developed, offers limited possibilities. For some localities it can be of great importance, and where new lands are to be developed, as in the tropics, some large-scale migrations will be required.

Migrations like those responsible for the settlement of the North American continent or Oceania are not likely to be repeated in the foreseeable future. The very large sacrifices of income, health, and levels of living which many of the settlers were willing to make in the expectation of land ownership and future returns are less attractive to the settlers of modern times. The governments of the receiving countries, as well as those of the countries sending the migrants, generally set standards of facilities and services which may involve considerable outlays of capital if the settlement is to be effective. The modern concept of the obligations of a government to its citizens calls for a greater provision of services for health, education, communication, and transportation and other social services than those of 100 to 150 years ago. Costs of settlements have increased accordingly and costs of overseas transportation have become

an important obstacle. Costs of $7,000 to $10,000 per agricultural settler are not uncommon.

One illustration of the present situation is found in the report that the Canadian Government has concluded, that it is more economical to settle some of its new settlers in areas already occupied, even if it is necessary to purchase going farms at $3,000 to $4,000, than it would be to carve a completely new settlement out of the wilderness.

In many areas which are already settled, what is required to make more effective use of the human resources which are now available is to provide the farm people with more capital. This may mean the development of large-scale projects for land reclamation, for irrigation or drainage, for purchase of machinery or equipment, for conditioning of land, for planting, etc. It may, however, and in many cases it does, mean the provision of small-scale improvements in the availability of land or water or provision of capital to make possible the adoption on a small scale of practices already known and tested in the area. The substitution of a hand threshing machine or a simple binder for threshing by flail or by tramping out the grain and winnowing it, may represent an advance greater than that achieved by the substitution of a new machine for an older, less efficient one. A simple drainage operation and some lime and fertilizer may restore to agricultural use land that has become waterlogged and unusable. Inexpensive insecticides and tools to apply them or simple improvements in storage can provide a small farmer with more crops to use or sell. It is not to be expected that the agriculturalist carrying on practices like those which were common in the Stone Age will or should shift immediately to the most advanced practices of a highly mechanized agriculture. The effort to make that shift may lead the agriculturalist into activities which are economically less justifiable than those outmoded ones which are currently being followed. Immeasurable damage has already been done where devotees of farm practices adapted to one local situation have attempted to carry these into other situations to which they are definitely

ill adapted. A great deal of effort is required to make available to the farmers of the underdeveloped parts of the world practices and facilities which are definitely within their range of comprehension and which are adjusted to goals that are within reach. Agricultural technology in the more advanced countries has been so completely oriented to large units of operation, with high capital requirements, that very frequently the smaller scale operation has been completely neglected. Not only has the development of technology which can be applied on the smaller farms lagged behind, but there has been an even greater lag in the development of social institutions whereby the small farm holder could benefit from the newer developments through cooperative ownership and use, through custom work, through public ownership, and the like.

One of the major problems in this field is that of developing a desire for and an appreciation of the improvements that are within the reach of the agriculturalist. The pragmatic attitude toward farm practices which is characteristic of the operators in the more highly developed countries represents a favorable soil for the introduction, testing and adoption of improved techniques. In those cases the old is not revered for its own sake, but is constantly being placed in competition with the new, and each practice must justify itself in terms of the returns it yields. The fact that many farm operators have been misled into adopting the new simply because of its newness is not germane; what is important is the attitude of constant questioning and examination, and the faith in the possibility of change and improvement. Not only is this attitude lacking in many groups, but thoughtful persons in some non-Western cultures oppose its spread on the basis that it is one part of the disorganization of Western Civilization.

The adoption of improved techniques in agricultural production meets with many obstacles, even in the more highly developed countries. It is a commonplace among agricultural leaders in any country that production could be greatly increased without adverse effects upon the basic resources if

farmers could be persuaded to adopt the improved techniques which are available and which are adapted to their local conditions. Moreover, there are considerable losses after crops are actually grown. A recent estimate from Colombia, for instance, is that 10 per cent of the corn, rice, wheat, and beans grown in any one year are lost because of inadequate storage. Estimates from a number of Asian countries indicate that large quantities of rice are lost annually because of field pests and inefficient methods of harvesting, storage, and handling.

The Agricultural Extension Service in the United States and similar endeavors in many other countries are testimony to the practical results that can be achieved through securing general acceptance of improvements in the agricultural techniques. The fact that existing practices in any area are interwoven with the whole social fabric and that in some areas agricultural practices are intimately associated with religious practices, may present significant obstacles to change. However, utilization of the knowledge of the local culture and of the motivations which are operative within it has often led to successful efforts at change.

D. Spencer Hatch reports an incident from India which illustrates the nature of such obstacles and a successful approach to them. He writes:

> In order to improve the flocks and to make poultry keeping more popular, a religious taboo had to be faced frankly. Many Hindus simply would not eat eggs because in so doing they killed the life germ in the egg. To overcome this cultural obstacle, 'vegetarian eggs' had to be put on the market after the people were shown the impossible—that unfertilized eggs had absolutely no sign or potentiality of life any more than did milk from sacred cows, and that they could be eaten with the greatest safety, assurance, and profit.
>
> Once this hurdle had been taken the project got in full swing. Eggs were given to village leaders who were ready to spend enough time at the Center to learn how to care for the eggs and the chickens when hatched. The pure-bred fowls which resulted

were propaganda enough. Then a Cock Circuit was organized. Any village family who would get rid of their common cocks could have a pure-bred cock for two months, during which time they had to set whatever eggs were laid. Another development was the establishment of the simplest co-operative egg marketing which, in a sense, rounded out the poultry project.[4]

It is a common mistake in discussions of the relation of population to resources, to consider population as the independent variable and to project increases of population without regard to the economic and social changes which provide the setting within which demographic processes occur. Very little is known about the basic motivations behind the persistence of the high fertility rates that characterize rural and agricultural populations. Nor is there any adequate information concerning the extent to which practices which once were rationalized in terms of economic need or in terms of the desire for a male offspring to carry on the family line and to conserve the family property are subject to modification when the original needs no longer exist. As the potentiality of mortality control becomes more and more a fact in the lives of people, an effect upon fertility seems inevitable, though we do not know today by what processes the idea of voluntary control is extended from mortality to fertility. The East African woman who discovered that babies which were nursed had a lower mortality than those which were fed with the gruel that is the mainstay of an adult diet, found also that prolongation of the nursing period, with the taboos on sexual intercourse by nursing women, had a significant effect on total fertility. The culture of any people is an integrated whole, and it is inconceivable that radical changes in one phase would not have significant effects on all others, even though the effects are slow in spreading.

One-fifth of the world's population lives in areas in which the shift from high mortality and high fertility to lower mortality and lower fertility is largely completed. In most of these

[4] Hatch, D. Spencer: Extension Experience in India, *in* FARMERS OF THE WORLD (Edited by Edmund de S Brunner, Irwin T. Sanders, and Douglas Ensminger). New York, Columbia University Press, 1945. 224 pages.

countries the control of fertility is firmly established in the culture pattern, and even the recent increases in fertility reflect the extent to which controlled fertility responds to economic and social changes. Another one-fifth of the world's population lives in areas which are well advanced in the demographic transition from high to low fertility. One after another of the countries in this group can be expected to move over into the first group.

Three-fifths of the world's population still live in areas where famines and epidemics, chronic malnutrition, and debilitating diseases are major forces in controlling population numbers. Mortality control from infectious diseases is within reach of a large portion of the population of these areas and can be expected to be rapidly adopted. Epidemic control and famine relief call for greater political stability, improvement of agriculture, and development of industry. How quickly control of fertility follows, and how readily the pattern of fertility control will be developed in the large agrarian areas is a matter on which little can be said definitely at the present time. It would be equally unrealistic to assume that this will not happen or to assume that it will develop by itself. In this field there is today a great dearth of knowledge and an urgent need for substituting concrete research for armchair speculation which may be affected on the one hand by the emergent nationalism of areas which, until recently, were colonies, or by the fears of highly developed areas which hope to preserve their superior position against the dangers of rapidly growing populations which may eventually take away the advantages that are now enjoyed.

A major obstacle to the effective use of the human resources in agriculture today is lack of knowledge, not of knowledge of what to do, but of how to do it, of the social processes by which change occurs, and by which desirable changes can be brought about within a framework of the political and social values which we hold to be fundamental. Given that knowledge, the question still remains, whether the necessary changes will be

made in economic, social, and political institutions to bring about the improvements that are within reach.

PROBLEMS IN HEALTH PROMOTION IN THE FAR EAST

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AFTER ten years' experience in public health work in China and India, and numerous inspections of public health activities in other Far Eastern countries, the justification of health measures in the face of demographic realities presents a challenge. Public health programs play an important part in efforts to develop and utilize human resources in these areas. However, these programs, while undoubtedly promoting human welfare in an immediate sense, may defeat their own ends through their tendency to contribute in the long run to the creation of new problems. This paper puts forward certain views, representing a synthesis of field experience and study, on population growth, the methods and personnel for raising health standards, and the interrelation of public health with other social fields.

The Chief Problem—Population Growth. The chief problem of the Far East which confronts all students of social science, including health administrators, is the growth of population. Population density is related to natural resources, to the actual and potential level of agriculture and industrial production, and also to the cultural environment of the people concerned. At this round table, as well as at those sponsored by the Milbank Fund two years ago, recognition of these basic facts has been apparent. Moreover, there is agreement that in undeveloped areas population problems are in pressing need of solution. In the Far East, recent and, in some areas, dramatic reductions in mortality are producing significant increases in population density. Public health measures have contributed to decreased mortality; further public health progress may aggravate the situation unless accompanied by progress in all other socio-economic fields.

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It is assumed that this gathering has an understanding of the demographic situation of the Far East. The general background was presented clearly at a previous round table. High fertility and declining death rates have in recent decades been characteristic of most of the region. Japan, which demographically occupies an intermediate position between East and West, serves as the exception to this general picture. From 1920 to 1938 birth and death rates in Japan decreased in almost parallel fashion. In general, postwar statistics indicate that growth has continued or accelerated, rather than diminished. Recent figures from Japan show moderate increases in natality over prewar years in common with the Western world. The birth rate in Japan for 1937 was 30.8 per thousand, while the 1948 rate was 33.8. The reported birth rates of Ceylon for the period 1931–1940 averaged 36.4 per thousand; this rate rose to 39.4 in 1947 and 40.2 in 1948. In India the recorded birth rate declined slightly during the war years, partly because of less efficient registration. Such changes probably represent war-time effects rather than any significant change in the reproductive pattern.

On the other hand, the decrease in mortality has been impressive in several Far Eastern areas. The rate in Japan decreased from a prewar level of 16–17 per thousand to the 1948 figure of 12 per thousand. Ceylon's death rate was reduced from 20–22 per thousand to 13.2 in 1948. Preliminary evidence from India and the Philippines suggests that mortality decreases will be observed there also.

Thus the postwar picture is one of further natural increases in the Orient. In 1948 the rate of natural increase in Japan was 2.1 per cent, while in Ceylon it reached 2.7 per cent for the year. In the opinion of many persons the time has come when public health workers must face squarely this problem of population growth and share with others the responsibility for its solution.

The Rationale of Public Health and Hygiene. How does the population growth resulting from decreased mortality affect

the position of public health work? Unless agriculture and industry are expanded to meet the needs of larger numbers of people, the effort to raise the standards of living may fail, and the existing low levels may be further depressed. The broad aims of "Point Four" programs cannot be realized if application of the programs leads to growth in population without accompanying improvements in the standards of living. There should be a justification for improved health over and above humanitarian considerations.

In most of the Far East, and the Middle East also, infant mortality rates of less than 100 per thousand live births are unusual; rates of 150 to 250 are the general rule. This represents a 15 to 25 per cent wastage of births. Another measure of the prodigality is observed in India, where 43 per cent of deaths occur before five years of age, and close to 50 per cent of the total mortality takes place before the tenth year of life. The consequent economic as well as human wastage is obvious. A system under which time, labor, and food are expended on many children who do not survive to play any role in production is certainly an inefficient one. When the average expectation of life at birth is about 30 years, as it is in India and China, the loss in economic terms must be tremendous.

Another practical argument in favor of attempts to reduce morbidity as well as mortality concerns the efficiency of labor. Two casual examples which came to my attention recently can be mentioned in this connection. The total labor costs of a certain jute company for the same manufactured product have proved greater in Bengal, India, where individual labor is cheap, than in Massachusetts, where high individual wage rates prevail. Secondly, it is reputed that bicycles produced in Great Britain could be sold in India for less than bicycles made locally, in spite of shipping expenses and the substantial wage differential between the two countries. While numerous factors enter into such comparisons, health conditions are surely a considerable force in agricultural and industrial efficiency. In an unhealthy environment cheap labor is not inexpensive in

terms of total production costs, and ill health hinders efforts to improve economic levels.

Health education should contribute to a realization of the worth of human life and to recognition of the fact that the number of survivors is more important than the gross number of births. The modern doctrine which holds health to be a positive entity rather than merely the control of disease should be extended to the Eastern world. Public health activities constitute an essential element of the total social development necessary for better agriculture and industry. Public health organizations, particularly those in the field of maternity and child welfare, provide an opportunity for acquiring a greater understanding of human fertility, an understanding which may assist eventually in the improvement and control of reproduction. By means of visual and auditory teaching and by demonstrations, public health can hasten the time when the peoples of the Far Eastern countries desire and beget smaller families.

Rights versus Duties and Responsibility for Health. In making a case for health promotion I have not cited the preamble of the constitution of the World Health Organization. This oft-quoted affirmation that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being" has the dual merit of disowning any spirit of discrimination and qualifying the extent of moral obligation with the phrase "of the highest attainable standard." No one is committed beyond what is obtainable under the given conditions. The standard naturally then differs for America, Europe, China or India, and is limited by the resources, individual abilities of the population and characteristic social organization of the particular area.

Illustrative of an era where human rights are very much in the foreground is the universal declaration approved by the United Nations General Assembly in December, 1948. At present this declaration is receiving implementation through a covenant. The thirty articles of the declaration include a long list

of the rights of "everyone," expounded in general terms. These rights concern equality, slavery, legal status and protection, and the various freedoms—movement, religion, thought, speech, assembly, and the franchise. Rights of employment and leisure, the standard of living, including health, and rights regarding education and cultural life are also covered. In only one place, Article 29, does the word "duties" appear. "Duties to the community" subordinate rights and freedoms to the requirements of morality, public order, and general welfare.

At the risk of being considered iconoclastic, I question whether too much emphasis is not placed on rights and too little attention given to duties and obligations. It can be argued that inherent or inalienable rights do not exist. As an instance, the right of an infant to good health cannot be exercised unless both family and community assume the responsibility of making that good health possible. Rights derive from goals accepted by the community and are subject to change as the objectives themselves evolve. Logically then, every right should be balanced by a duty designed to enable the individual and the society to achieve the desired aims. In the field of public health, for example, the right to health and medical care should specify the duty of constituted authority to restrict the individual for the health protection of others and the obligation of individuals to cooperate for the public welfare, just as the right to social security implies acceptance of, and ability to meet, taxation.

The purposes of charters and covenants on human rights are, of course, appreciated. Their function is presumably to stimulate governments to accord their citizens all just privileges and to encourage individuals to claim the rights and services due them. At the same time, however, we must take care not to foster a psychology in which the peoples of underdeveloped areas expect the rest of the world to feed, clothe, and shelter them with little effort on their own part. If the time ever arrives when food distribution is proposed primarily on the basis of need rather than purchasing power our thinking will

have to undergo sharp revision. Under a world government such a situation might develop, but until current views on sovereignty are modified, it seems unlikely and illogical. Present conditions require that national expectations and individual voices take into account duties as well as rights.

Problem of Health Personnel. The administration of health and medical programs requires trained personnel, including health officers, doctors, engineers, nurses, midwives, and other auxiliary groups. Shortages are felt in many countries of the world, but in the undeveloped areas of the Far East the needs are particularly acute. No plan for health improvement can be better than the quantity and quality of the staff which carries it out. Although the number of persons required for area health programs varies in keeping with many factors, among them the size and dispersion of the population, the adequacy of communications facilities and the nature and efficiency of the services to be rendered, the critical element in appraising a health situation or planning for action is the amount of available personnel. What can be accomplished depends for the most part on the extent of personnel resources; these should therefore be considered in defining objectives. For example, in China there are about 12,000 doctors and 6,000 nurses to serve the four hundred million or more inhabitants; the ratio is roughly one doctor to 35,000 persons. In India there were some 47,000 doctors and 7,000 nurses in the provinces of the former British India; that is, a proportion of one doctor per 6,500 inhabitants. Any program of health improvement for these two vast countries whose people constitute 40 per cent of the world's population must allow for the limitations imposed by a relative dearth of personnel.

However, personnel shortages need not prove to be insuperable obstacles. In the Netherlands East Indies we observed up to the war period a situation where a small medical staff (1,310 registered doctors, supported by auxiliary personnel) provided a well-administered service which controlled all the major epidemic diseases except malaria. Medical and hospital

facilities, at least for the cities and large towns, were fairly well distributed. These conditions suggest that a carefully chosen point of attack together with efficient utilization of what personnel there is can produce measurable results. Likewise, in Ceylon the scarcity of doctors (one to 8,000 persons) has been compensated partly by an even and effective distribution of public health and medical care. The Ceylonese government, in whose service 60 per cent of the country's physicians are employed, has been instrumental in bringing this circumstance about. In certain Oriental areas at least, it follows that state or socialized medicine, or whatever label it may be given, can meet more efficiently a larger share of the public needs than can private endeavors.

To consider areas of a different educational status, we find that physicians in the Philippines are in the ratio of one to 4,000 persons (4,500 doctors). By intensive methods of education Japan has reached a level of one doctor per 1,100 inhabitants, which signifies their expansion to Western quantitative standards. In the islands of Japan, as in some other Far Eastern countries, a small body of well-trained medical personnel exists, but the majority are of inferior quality by our standards. However, to accomplish epidemic disease control through large-scale immunization and other mass sanitary measures, highly specialized education is not required at the local levels. In such areas as Japan where mortality rates have decreased notably, the availability of health-medical personnel has been a significant factor contributing to the spread and enforcement of public health measures.

Figures on other categories of personnel, such as nurses, midwives, and sanitary workers are not presented, but in general, Far Eastern conditions vary from extreme shortage to a limited adequacy. Nurses in the Far East are generally of the servant or ward attendant type. In China, the Philippines and a few other centers, the foundation for a technical nursing profession has been laid.

Unfortunately, elaborate plans are sometimes framed during

health surveys and developed with little regard for technical staff. The available personnel may be meager, or its provision through education and training may mean a long-term pull at best. After some experience in the planning and execution of health programs in various countries, I find that I am more exasperated by over-ambitious efforts to expand health work beyond reason than I am fearful of retarded growth.

These considerations merit the attention of the planners responsible for the health part of the "Point Four" program. Progress in technical aid will depend on the quantity and quality of personnel, and application cannot exceed the numbers who are available or who can readily be prepared for the required tasks. In addition to local personnel, the implementation of "Point Four" will require foreign staff. The preliminary plans, I understand, contemplate up to 800 technical health workers. Finding such a number in this or other countries is not a simple undertaking. To obtain this number of competent workers may require borrowing from and weakening existing organizations in the more advanced countries for the sake of less developed regions. Presumably, the function of such technical staff will be to plan, to train others, and to advise local officials, rather than to assume administrative responsibility. In the selection of foreign personnel for "Point Four" activities or for any international health work, the recruitment of satisfactory individuals is a problem of importance.

The experience of the United Nations Relief and Rehabilitation Administration and other postwar agencies in sending missions abroad should be kept in mind. Without detracting from their accomplishments, we should try to do a better job and avoid the errors of the past. The finding and selection of staff, whether in health fields or in other phases of "Point Four" assistance, demands careful preparation and fixing of criteria. A screening process for technical personnel who are to serve abroad, and particularly in the Far East, should result in the selection of individuals who give assurance or promise of these general qualifications:

1. A sound education and experience in the specified field; this requisite is basic, but it alone is not enough.

2. A capacity to adjust; in other terms, a real or potential interest in the welfare of the people and country where assigned.

3. The ability and patience to live and work with the existing materials and facilities and in the environment of the chosen area.

4. Personal stability and a satisfactory domestic history. Requirements regarding health and age limits are other factors, but items 2 and 3 above are especially important. Remuneration must be sufficient to obtain the type of workers desired without being excessive; neither volunteers nor those who are attracted by inflated salaries or exaggerated allowance have proved satisfactory in the past. Security and freedom for a sufficient period to do the job assigned is another element necessary for success; that is, frequent transfers or changed assignments are hindrances to effective work.

The Hazards of Health Promotion by Modern Weapons. In today's public health armamentarium there are some new as well as some old weapons which permit a mass attack upon certain diseases by relatively small staffs. The insecticides such as DDT offer a dramatic means of reducing the morbidity and mortality of malaria and certain other diseases. In Ceylon, for example, an effective island-wide malaria control program, based on DDT spraying, has apparently reduced the general mortality by one third within a few years. This campaign was accomplished with a staff of less than 1,000 workers at an annual cost of approximately fifteen cents per capita for the seven million inhabitants. Similar programs are now in progress in Bombay and Madras provinces and the state of Mysore in India, and the mortality among population groups of several millions will be lowered.

Programs of immunization against smallpox, cholera, typhoid, and plague, combined with other sanitary measures and efficiently administered, have resulted in the disappearance of these diseases. The use of BCG vaccine against tuberculosis

is being extended on a major scale in the Orient, and this measure portends a further reduction in general mortality (if we accept for the present that this vaccine gives protection). In Japan thirty-one million persons in certain age groups have already been immunized with BCG vaccine since 1943. These activities require trained personnel, but in practice such programs can be carried out with less staff than is required for measures of personal hygiene such as maternity and child welfare, public health nursing and the health care which primarily concerns individuals. Current plans of international agencies to expand BCG activities and malaria control campaigns prompt the question of what the ultimate effect on mortality in the Far East will be.

Other modern weapons, such as the newer antimalarial drugs, sulfa drugs and antibiotics, may well contribute in time to a further marked change in total deaths. The medical staff required for distribution of these therapeutic agents and their cost are the principal limiting factors.

It is well established that provision of safe water supplies and sewerage will reduce mortality greatly. In public health practice it is an historical fact that such sanitary measures pay large dividends more quickly than other branches of health promotion. The Western world has attained improved health by means of such expenditures. The Far East is still backward in providing safe water and satisfactory disposal of excreta. When sanitary engineers and funds are available, further changes in the sanitary picture and in mortality rates can be anticipated. Again, the principal checks on modern sanitation in the Orient are trained personnel shortages and the lack of capital.

In referring to the concomitant hazards of certain public health measures, I do not imply that these measures should be withheld. Rather it is pointed out that since campaigns to reduce mortality—particularly through inexpensive mass procedures—can be successfully executed by small numbers of trained personnel with little more than passive support from

the general public, the risk exists that health improvement may outrun other phases of socio-economic development. An overall policy which assures concurrent attention to food production and the social changes which relate to fertility would seem the better part of social wisdom.

National and International Policy in Undeveloped Areas. The basic tenet guiding Western and international agencies should be that of helping Far Eastern countries to help themselves. In practice this means training of local personnel, study of local problems and the demonstration of modern methods with active participation by local people. This general policy has governed Rockefeller Foundation work for a long time. It would seem that similar motivations could and do guide the World Health Organization and the promoters of the "Point Four" program.

The stage at which a demonstration becomes a large-scale operation is not always clear. Health programs can be pushed to the point of changing the local situation to a measurable extent. At times the temptation exists to add glory for the sponsoring organization by continuing the work beyond the period needed to activate the local program. Indigenous services may move more slowly and less efficiently, but in the long run their natural pace may produce greater benefit. The foreign organization should not have responsibility for operations in a major health program.

Further, the question can be posed whether public health programs sponsored from abroad should not always be coordinated with a general plan to develop all spheres of social activity, including education, agriculture, communications, and industry. To succeed in such integrated planning is not easy, but the objective is highly desirable. These thoughts may be illustrated by considering Egypt and assuming an hypothetical situation. In this country of nineteen million people, as recorded in 1947, there is an average of about 1,400 persons per square mile of arable land. The birth rate is 40 or 45 per thousand; the general death rate averages 26 to 28 per thousand.

With modern weapons a marked reduction in the death rate of Egypt at a reasonable cost appears quite conceivable. For example, the application of a country-wide insecticidal program, given the necessary organization and funds, would result, I believe, in lowering the mortality rate to 20 and perhaps under 20. This would add approximately 150,000 survivors to the population per year. Whether the decrease in mortality would promote the welfare of Egypt is doubtful unless the program were accompanied by measures to expand agriculture and industry, to encourage migration to newly opened areas and to modify human fertility. In Egypt, none of these goals is likely to be achieved until the Egyptians themselves become convinced that they have a serious population problem and do the necessary thinking and planning to meet the situation. This case illustrates the wisdom of having international agencies refrain from large-scale operations except insofar as these assist local efforts and further over-all social programs.

In dealing with the theme of health promotion the subject of fertility has at numerous points been touched upon. My assignment does not include a discussion of this problem, but perhaps the way has been prepared for the next paper. It is my personal conviction that in the development and utilization of human resources in the Far East the major unsolved problem is presented by man's reproductive capacity.